

A
SYSTEM OF SURGERY,

BY

J. M. CHELIUS.

TRANSLATED FROM THE GERMAN

BY

JOHN F. SOUTH.

—

VOL I

A

S Y S T E M O F S U R G E R Y,

BY

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&c &c &c

TRANSLATED FROM THE GERMAN,

AND

ACCOMPANIED WITH ADDITIONAL NOTES AND OBSERVATIONS,

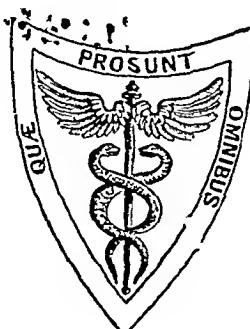
BY

J O H N F . S O U T H ,

LATE PROFESSOR OF SURGERY TO THE ROYAL COLLEGE OF SURGEONS OF ENGLAND
AND ONE OF THE SURGEONS TO ST THOMAS'S HOSPITAL

IN THREE VOLUMES

. VOL. I



P H I L A D E L P H I A
L E A & B L A N C H A R D

1847

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TO

J O S E P H H E N R Y G R E E N, F R S

PROFESSOR OF ANATOMY TO THE ROYAL ACADEMY,
AND

SENIOR SURGEON OF ST THOMAS'S HOSPITAL,

THIS WORK

IS INSCRIBFD,

AS A TESTIMONY

TO HIS HIGH PROFESSIONAL AND MORAL WORTH,

AND

TH CHERISHED REMEMBRANCE OF A WARM AND STEADY FRIENDSHIP
UNDER MANY TRYING CIRCUMSTANCES

DURING MORE THAN THREE AND THIRTY YEARS,

BY

HIS AFFECTIONATE FRIEND AND COLLEAGUE,

JOHN F SOUTH

Blackheath Park, 1847

AMERICAN PUBLISHERS' NOTICE

THE work of CHELIUS on Surgery has been long used as the text-book in the principal schools of Germany, and the fact that it has passed through six editions in that country, and been translated into seven languages is a sufficient proof of the estimation in which it is held in Europe. Its methodical arrangement and practical character cannot fail to render it valuable to the American student, while its accuracy, conciseness and copious analytical index make it admirably suited as a book of reference for the practitioner. With the notes and additions of the translator, Mr John F South, which are numerous and important, embodying the results and opinions of the most distinguished Surgeons of the day, it is believed to be the most complete and extended system of Surgery in our language. The present edition is reprinted entire from the English, some references to the surgical literature of this country which were omitted, having been supplied by Dr G W Norris of this city.

Philadelphia, July 1847

P R E F A C E.

AUTHOR'S PREFACE TO THE FIRST EDITION

THE object I had in view in the production of the present work was a short and clear description of Surgical Diseases and their Treatment, in which I have endeavoured, as far as possible, to point out the best works both of these and foreign countries. According to the plan of this book, many things are slightly treated of, and many only hinted at, which will be enlarged on in my oral lectures

I must not be blamed for having omitted Diseases of the Eye and Ear, for Ophthalmic Surgery has attained so great importance as to require a special treatise, and, like many other Teachers, I deliver a separate course of Lectures on Diseases of the Eye and Ear.

Heidelberg, November 1821

PREFACE TO THE FIFTH EDITION *

THE short space of time in which a new Edition has become necessary, (although the fourth consisted of above two thousand copies,) and the translations of it which have appeared in several different languages, are such honourable and pleasing testimonials of the continued favourable reception of this book, that I have, with the greatest diligence, endeavoured to enlarge and improve it, in correspondence with the present state of Surgery. The last six years have been specially fruitful in important events throughout the whole realm of Surgery, and I trust I have not overlooked any thing of consequence. To M PIGNE, I must offer my best thanks for the many additions he has made to his French translation

Heidelberg, June 1839

* Second Edition, Dec., 1825, Third Edition, April, 1828, Fourth Edition, April, 1833

PREFACE TO THE SIXTH EDITION

ALTHOUGH from the extremely short space of time which has rendered a sixth edition of this Handbook necessary, very numerous additions and alterations cannot be made, yet I hope, by much improvement, to have increased its utility May it still continue to merit the favourable reception it has hitherto enjoyed

CHELIUS*Heidelberg, August 1843.*

TRANSLATOR'S PREFACE.

IT is a common practice in the German Medical Schools for the Teacher to publish a text-book on the subject of which he treats, and, taking this with him into the Class-room, to enlarge upon it, and thus form his lecture. This is the reason why, in the work of CHELIUS, many things are but slightly noticed, and some only hinted at, which seem worthy of being fully and completely detailed.

Had I confined myself to a mere translation of my original, many important points must have been omitted, and the object for which I undertook the publication of the Handbook could not have been attained. I was therefore obliged to resort to annotations and comments, the result of my own experience and reading, for the purpose of filling up and enlarging the Author's short notices, so as to render them more generally useful both to the student and the practitioner. In doing this I have far exceeded the limits I had originally proposed to myself, but the subject is so important, and fresh matter was so constantly at hand, that my great difficulty has been in restricting my work within present bounds.

My first object in undertaking this task was to render Surgeons in this country more conversant with foreign practice than they had hitherto been. French Surgery, with its showy, but sometimes too hazardous operations, had indeed been pretty well known among us ever since the peace of 1815, soon after which, medical students, with other British visitors, flocked in crowds to the French capital. But of the Surgery of the German Schools very little had been known in England until within the last few years, no standard German book having appeared in English since the publication of HEISTER's valuable work a century ago.

Several years since, when I was preparing to deliver Lectures on Surgery at St Thomas's Hospital, (soon after commencing which, severe illness forced me to resign my appointment,) I was thankful for the great assistance I derived from becoming acquainted with CHELIUS's excellent *Handbuch der Chirurgie*, and as I grew more familiar with the work, it appeared to me that a translation of it would present to my countrymen a fair and satisfactory view of the important services which our German brethren have rendered to Surgery. Still, however, I felt it would be necessary to add notes of my own, for the purpose of explaining and discussing occasional, and sometimes important, differences in the practice of the German and English Schools. In doing this I trust I have fairly stated the arguments on both sides, and shown on what grounds I have decided between them.

I shall be charged, I fear, with having buried my Author beneath a mass of notes and comments. They are indeed numerous, and they might occasionally have been made shorter, had I condensed, in my own words, the opinions of the authors I have cited. To this practice, however, though not uncommon, I am utterly opposed. The meaning of a writer ought to be best set forth in his own words, and if others attempt to convey his

meaning briefly, they not unfrequently fail to declare his opinions, or they altogether misrepresent them I have, therefore, with but few and unimportant exceptions, quoted the statements of authors in their original words I have also, as far as possible, endeavoured to award to the originators of new modes of practice, their just need of credit, and if, as may occasionally have happened, I have passed by unnoticed any of the leading Surgical writers of the British Schools, I hope on a future opportunity to repair my seeming inattention

To Professor CHELIUS, with whom I communicated previously to the commencement of my publication, my best thanks are due, for his kindness in furnishing me with the several parts of his new edition, at the earliest opportunity I trust he will be gratified with the pains I have taken to place him in a condition to be estimated as he truly deserves to be by British Surgeons, and to make his work a stock book in English Surgical Literature.

I have also to thank many kind friends who have furnished me with information which has been of great use to me, and which I could not otherwise have obtained But to none I am more deeply indebted than to my able and excellent friend JAMES DIXON, Surgeon to the London Ophthalmic Hospital, and lately demonstrator of Anatomy in St Thomas's School, for his ready and constant assistance during the whole course of this work, and it is with much pleasure that I take this opportunity of offering my testimony to his high professional talent and private worth

Before I conclude, it is but justice to my Publisher to acknowledge his liberality in allowing me entirely to control and conduct this work, according to my own views, no less than his readiness in undertaking, solely on my recommendation, the publication of a book, which, although well known and estimated abroad, was almost new to English Surgeons, and could only be brought out, in the manner I desired, at considerable risk and expense To him, therefore, is due in part the appearance of this *eighth translation* of CHELIUS's Handbook, since without his assistance it would probably have never seen the light

I must at least feel gratified that my Author's celebrity has reached to the western hemisphere it will be extended to India, through the munificence of the Directors of the Honourable East India Company

JOHN F SOUTH

Blackheath, February, 1847

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E R R A T A

VOL I

Page	Line
198	7, <i>for</i> caoutchouc, <i>read</i> gelatine
242	13, <i>dele</i> and Gonorrhœal ophthalmia
343	1, <i>for</i> feather, <i>read</i> spring
546	28, <i>for</i> except, <i>read</i> as
552	26, <i>for</i> fish-bone, <i>read</i> whale-bone

VOL II

21	48, <i>for</i> Wolf's-jaw, <i>read</i> Wolf's-throat,
40	17, <i>read</i> habitual costiveness is not
40	32, <i>dele</i> , where
59	49, <i>for</i> graphit, <i>read</i> plumbago,
65	15, <i>for</i> scarabæi, <i>read</i> scabiei,
101	(e) <i>for</i> potass Iod gr ½, <i>read</i> potass Iod 3ss
103	50, <i>point thus</i> , return more readily, make
151	1, <i>for</i> rosin, <i>read</i> gum,
315	7, <i>for</i> down-lying, <i>read</i> lying-in
241	7, <i>for</i> Upwards, <i>read</i> Downwards
258	8, <i>for</i> intestine, <i>read</i> viscus
278	40, <i>for</i> sore, <i>read</i> sac
343	29, <i>for</i> veins are, <i>read</i> vein is

VOL III

441	20, <i>for</i> the naked eye, <i>read</i> a magnifying glass,
488	27, <i>after</i> with, <i>insert</i> that part,
491	22, <i>for</i> rose-crown, <i>read</i> rosary
515	22, <i>for</i> plaster, <i>read</i> layer
555	43, <i>for</i> with, <i>read</i> without
609	28, <i>for</i> hips, <i>read</i> lips,

INTRODUCTION.

I

DEFINITION OF SURGERY — ITS RELATION TO THE HEALING ART IN GENERAL — DIVISION OF SURGICAL DISEASES

ALL diseases to which the animal organism is exposed, are the object of the science of healing, the purpose of which is their *prevention, cure, or alleviation*. The means we employ to these ends are either *dietetic* or *pharmaceutic*, or they consist in the *application of suitable mechanism*, which we call *surgical means*, and the doctrine of their proper employment, which is called *surgery*.

Every mechanical influence employed with skill upon the diseased organism is called a *surgical operation*. This influence consists either in a direct interference with the form and natural connexion of the part (*Bloody operations*, *Akiurgie* (a,) *Germ* ,) or only in a momentary or continued application of mechanism fitted to the surface of our bodies, to which belong *bandages* and *machines*, simple manipulations for restoring the natural position of parts, and the employment of suitable mechanism for repairing parts which have been destroyed (*Kosmetik* (b,) *Germ*)

There are diseases which specially require the employment of one or other class of the means just mentioned. The purpose, however, of the healing art is in most cases but imperfectly attained, if the medical man be not possessed of the requisite knowledge for deciding upon the necessary connexion of these means, so as properly to conduct their operation by a sufficient acquaintance with the laws of our organism, whence it necessarily follows that there cannot be established any true separation between the so-called *medical* and *surgical* treatment.

The employment of surgical means calls for peculiar dexterity and aptness which natural talents and disposition and long practice can alone confer. “*Esse autem chirurgus debet,*” says CELSUS (c,) “*adolescens, aut certè adolescentiae proprius, manu strenuâ, stabili nec unquam intemiscente, eâque non minus sinistrâ quam dextrâ promptus, acie oculorum acri clavisque, animo intrepidus, immisericors, sic, ut sanari velit eum, quem accepit, non ut clamore ejus motus, vel magis, quam res desiderat, properet, vel minus, quam necesse est, secet, sed perinde faciat omnia, ac si nullus ex vagitibus alterius affectus orinetur*” Only in reference therefore to the physical and psychical characters of the medical man, can there be any division in the practice of medicine and surgery in their attainment they cannot be separated, and, by the union of medical and surgi-

(a) 'Ak' the edge of a knife, &c; or, an operation

(b) Κοσμία, to set in order

(c) De Medicina, præf ad lib vii

cal study alone, can the foundation be destroyed upon which so much bungling, and so many practices unworthy of the spirit of high art, have hitherto been supported

The study and practice of Surgery are connected with great difficulty. The dexterity and exactitude with which surgical operations must be performed, can only be attained by long practice on the dead body, the opportunity for which is rare, and still rarer the perseverance necessary to overcome the various disagreeables therewith connected. How much does this practice on the dead body still leave imperfect when we have to meet operations on the living! In how many instances does the life of the patient depend momentarily on the hand of the operator—the restlessness of the patient, his cries, a peculiar sensation to which no practitioner is a stranger in operating on the living subject, and particularly in the beginning of his career, easily disturb his needful equanimity, render him anxious and incapable of perfecting his work with firmness and certainty. Therefore are we not surprised on reading the open confession of the great HALLER—“*Etsi chirurgæ cathedra per septendecim annos mihi concredata fuit, etsi in cadaveribus difficillimas administrationes chirurgicas frequenter ostendi, non tamen unquam vivum hominem incidere sustinui, nimis ne nocerem veritus*”

In the employment of surgical means the practitioner can only be guided by the most perfect anatomical knowledge. That knowledge of the structure of our body, with which the general practitioner is content, is insufficient for the operator. He must be most intimately acquainted by careful dissection with the position of every part, its relations to others, and the variations which in this respect may occur, so that this definite knowledge may direct him in every moment of an operation. Mere descriptive anatomy is not sufficient for the surgeon without that comparative anatomy which is directed to physiology, and which has in view the early developmental periods of the several organs, by which alone a true insight into the nature of so many diseases is possible.

All these difficulties connected with the acquirement and practice of Surgery, are sufficiently rewarded by the great superiority which, on the other hand, the practice of them offers. In most cases where surgical assistance is necessary, the possibility of preserving the patient depends upon it—we must, therefore, in desperate cases take bold measures, and the advance of Surgery within the last few years in this respect, has raised our astonishment at the heroism of art, as well as at the immeasurable resources of nature. In this point of view has MARCUS AURELIUS SEVERINUS most correctly entitled his book on surgical disease, *De Medicinâ Effiraci*.

The inadmissibility of dividing Medicine from Surgery is most palpable, when we endeavour to determine the object of the latter, and the diseases comprehended within its boundaries, as it never can have a perfectly determined limit in opposition to the other. All diseases which are cured by the application of mechanical means have been called surgical diseases, a definition at once too narrow and too comprehensive, as many so-called medical diseases are removed only by the application of surgical means, and many diseases are evidently within the jurisdiction of Surgery, which very often can be cured only by internal or ex-

ternal pharmaceutical means The distinction between external and internal diseases, which has been established as the ground of division between Surgery and Medicine, is entirely without meaning

Let us endeavour to find out some general characters of disease which to a certain extent might legally serve as the law for a nosological division, and to distinguish those diseases to which we would assign the name of surgical

As the phenomena of life present to us by the relative predominance of *powers and organs*, a *dynamic, potential* and *organic material phase*, on the intimate harmony of which health depends, so do we observe also in the diseased states of the organism, that sometimes the power, sometimes the organ, varies more from the natural type, whence arises the difference between *dynamic* and *organic diseases*. This distinction can, however, only indicate a relatively predominant suffering of one or other phase of life, since the organic body presents in itself an entire whole, of which the several parts and phenomena are in the closest mutual connexion with each other

The organic diseases are especially those which originate in a destruction of the natural condition, form, and structure of organized tissues, and therefore may generally depend, 1 *on the disturbance of organic connexion*, 2 *on the unnatural union of parts*, 3 *on the presence of foreign bodies*, 4 *on the degeneration of organic parts*, or *on the production of new structures*, 5 *on the entire loss*, and, 6, *on the superfluity of organic parts*

Organic diseases must be distinguished into such as have their seat in parts inaccessible to mechanical contrivances, and to our organs of touch, and whose cure therefore can only be attempted by dietetic and pharmaceutical remedies, or whose seat permits the employment of external means, and regulated contrivances, and which in most cases can be brought to heal only by these contrivances, with the assistance of dietetic and pharmaceutical aids. We may therefore distinguish as belonging to the province of Surgery all those organic diseases which have their seat in parts accessible to our organs of touch, or which allow of the employment of mechanical means for their cure

Although inflammation is excluded from this general definition, we must, however, still enumerate it generally, and particularly among the manifold origins of surgical diseases, when it attacks external parts. Inflammation in its course and results produces for the most part organic changes, and requires, when attacking external parts, almost always the employment of the so-called surgical means. Further, among the surgical diseases soon to be more particularly described, there is not one of which the cause is not inflammation, which in its course does not produce inflammation, or the cure of which is not to a certain extent singly and alone possible by inflammation

After these observations, we therefore prefer the following division for the setting forth of surgical diseases, which, if it be open to many objections, is, however, an arrangement of diseases according to their internal and actual agreement —

I DIVISION.—*Of inflammation*

- 1 *Of inflammation in general*
- 2 *Of some peculiar kinds of inflammation*
 - a Of erysipelas; b Of burns, c Of frost-bite; d Of boils, e Of carbuncle.
- 3 *Of inflammation in some special organs*
 - a Of inflammation of the tonsils, b Of the parotid gland, c Of the breasts, d Of the urethra, e Of the testicle, f Of the muscles of the loins, g Of the nail joints, h Of the joints, viz a. of the synovial membrane, b of the cartilages, c of the joint-ends of the bones, viz, aa in the hip-joint, bb in the shoulder-joint, cc in the knee-joint, and so on

II. DIVISION —*Diseases which consist in a disturbance of physical connexion.***i. Fresh solutions of continuity**

A Wounds, B Fractures

ii Old solutions,

A. Which do not suppurate, viz

a False joints, b Hare-lip, c Cleft in the soft palate, d Old rupture of the female perineum.

B Which do suppurate, viz

i Ulcers

1 In general.

2 In particular

a Atonic, b Scorbutic, c Scrofulous, d Gouty; e Impetiginous, f Venereal, g Bony ulcers or caries

ii Fistulas

a Salivary fistula, b Biliary fistula, c Faecal fistula and artificial anus, d Anal fistula, e Urinary fistula

iii Solutions of continuity by changed position of parts

1. Dislocations, 2 Ruptures, 3 Prolapses, 4 Distortions

iv Solutions of continuity by unnatural distension

1. In the arteries, aneurisms, 2 In the veins, varices, 3 In the capillary-vascular system, teleangiectasis

III DIVISION —*Diseases dependent on the unnatural adhesion of parts*

- 1 Ankylosis of the joint-ends of bones, 2 Growing together and narrowing of the aperture of the nostrils, 3 Unnatural adhesion of the tongue, 4 Adhesion of the gums to the cheeks, 5 Narrowing of the oesophagus, 6 Closing and narrowing of the rectum, 7 Growing together and narrowing of the prepuce, 8 Narrowing and closing of the urethra, 9 Closing and narrowing of the vagina and of the mouth of the womb.

IV DIVISION —*Foreign bodies***1 Foreign bodies introduced externally into our organism**

a into the nose, b into the mouth; c into the gullet and intestinal canal, d. into the wind-pipe

- 2 Foreign bodies formed in our organism by the retention of natural products
 - A Retentions in their proper cavities and receptacles
 - a Ranula, b Retention of urine, c Retention of the foetus in the womb or in the cavity of the belly (Cæsarean operation, section of the pubic symphysis, section of the belly)
 - B Extravasation external to the proper cavities or receptacles
 - a Blood swellings on the heads of new-born children, b Hæmatome, c Collections of blood in joints
- 3 Foreign bodies resulting from the accumulation of unnatural secreted fluids
 - a Lymphatic swellings, b Dropsy of joints, c Dropsy of the bursæ mucosæ, d Water in the head, spina bifida, e Water in the chest and empyema, f Dropsy of the pericardium, g Dropsy of the belly, h Dropsy of the ovary, i Hydrocele
- 4 Foreign bodies produced from the concretion of secreted fluids

V DIVISION — Diseases which consist in the degeneration of organic parts, or in the production of new structures

- 1 Enlargement of the tongue, 2 Bionchocele, 3 Enlarged clitoris; 4 Warts, 5 Bunions, 6 Horny growths, 7 Bony growths, 8 Fungus of the dura mater, 9 Fatty swellings, 10 Encysted swellings, 11 Cartilaginous bodies in joints, 12 Sarcoma, 13 Medullary fungus, 14 Polyps, 15 Cancer

VI DIVISION — Loss of organic parts.

- 1 Organic replacement of already lost parts, especially of the face, according to the Tagliacozian and Indian methods
- 2 Mechanical replacement Application of artificial limbs, and so on

VII DIVISION — Superfluity of organic parts

VIII DIVISION — Display of the elementary management of surgical operations

General surgical operations Bleeding, cupping, application of issues, introduction of setons, amputations, resections, and so on

II

HISTORICAL SKETCH OF SURGERY.

First period to the time of HIPPOCRATES
Second period from HIPPOCRATES to GALEN.
Third period from GALEN to the fifteenth century
Fourth period the sixteenth century to the middle of the seventeenth
Fifth period the second half of the seventeenth century to the present time

The origin of Surgery is founded on the relation of man to external nature, and on his disposition to alleviate the sufferings of his fellow men In ancient Egypt and Greece the history of Surgery lies in darkness, and it begins in a special sense with HIPPOCRATES, who collected the previously scattered facts, arranged them, and published rational views, drawn from his own experience It appears from his writings—*καθ' ἵπτρειον—περὶ αγκῶν—τερὶ τῶν εν κεφυλῇ τρωματῶν—περὶ ἀγθεών—περὶ εἰκῆν—περὶ συρεγγῶν*—that he was acquainted with a copious apparatus of instruments and bandages, and several operations exhibit an actual technical tendency In different parts of his Aphorisms he treats of surgical subjects

In the Alexandrian school Surgery became more prominent, as it rested on its proper basis, anatomy ERISISTRATUS and HEROPHILUS made the first examinations of human bodies We know of their followers and their performances only from subsequent writers

AURELIUS CORNELIUS CELSUS is the sole writer after HIPPOCRATES (a period of 400 years intervening between them) Although CELSUS lived at Rome, his writings for the most part belong to the Greeks In his seventh book he specially treats of surgical operations After CELSUS deserve to be mentioned SORANUS, ARCHIGENES, and RUFUS

CLAUDIUS GALENUS, born A D 131, lived at Rome under the Emperor MARCUS AURELIUS such of his writings as treat of Surgery are, for the most part, commentaries on those of HIPPOCRATES—as his *Ὑπόμνηματα τέλια εἰς τὸ βιβλιον Ἰπποκράτους κατ' ἵπτρειον—αὐτὰ περὶ αγκῶν—υπόμνημα τέσσαρα όρθρων—υπόμνημα εἰς τὸν αφορισμὸν* Besides which also his own Treatises, *περὶ τῶν ἐπιδεσμῶν—περὶ βόλλων, ἀντισπάσεως, σινόν, καὶ ἔγχαράζεως καὶ γαταγονοσμον—περὶ τῶν παρὰ Φυσιν δύκων—and θεραπευτικῆς μέθοδον βιβλιον* After GALENIUS there is a complete stand-still, and up to the sixteenth century there are but few writers ORIBASIUS, AETIUS, ALEXANDER of Tralles, and PAULUS of AEGINA

With the fall of the Roman Empire and the invasion of the Arabs, came a period of darkness and barbarism We find Surgery, at this time, in the hands of the Arabian physicians, characterized by the neglect of anatomy, with a copious instrumental apparatus, fear of the knife, and frequent employment of the cautery iron The most remarkable men of this period were EBN SINA and ABULCASEM

The practice of Medicine and Surgery was, during this time, in Christian Europe, in the hands of the clergy, and sank down to such imperfection, that the knowledge of operations, possessed by the Greeks, was no longer to be met with In the twelfth and thirteenth centuries, indeed, art and science raised themselves by the foundation of literary institutions, but as their most special object was the education of ecclesiastics, there was little gain to Surgery The latter was, at a subsequent period, completely separated, by two decrees of the Pope, from Medicine, and the priests were forbidden *every bloody operation* on pain of excommunication At this time arose the barbery system, under which the barbers of the priests were employed by them for the performance of the lesser operations of Surgery In Italy alone was there yet any striving towards improvement, and Surgery still partially remained in the hands of better practitioners

In the year 1311, PITARD, of Paris, collected the Surgeons into a com-

pany, which formed itself into a college, but, owing to the long-continued disputes with the medical faculty, and without advance in anatomy, Surgery remained in its restricted condition

[During a large portion of the fourteenth century flourished in England JOHN OF ARDEN, who was born in 1307, and certainly lived till after 1377, as, in a manuscript (MSS Sloane, No 75, in Brit Mus) which, he says, "propriâ manu meâ exaram," he declares himself 70 years old, "regni regis Richardi 2nd primo" From examination of his works, written in Latin, several manuscripts of which, together with many English translations in MSS of the whole or part of his works, are in the library of the British Museum and in the Bodleian Library at Oxford, it is probable that he did not know much about anatomy, though perhaps he was not more ignorant than his contemporaries But he was certainly an attentive observer and a careful recorder of what he saw He wrote specially upon anal fistula, which was translated by READ in 1588, and also a Practice of Surgery, in which, among other things, he speaks of sores on the penis, also of gonorrhœa, and describes what is to be done when a stone gets into the urethra From the number of manuscripts and translations it is quite evident he was long held in great repute by his countrymen, and his works are quite equal and much more original than those of surgical writers of the early part of the sixteenth century It is much to be regretted that the several manuscripts have not hitherto been collated and published, as they present an excellent view of the state of Surgery in England at this period —J F S]

With GUIDO DE CHAULIACO (who lived at Avignon) first commenced a period of independent exertion and reference of Surgery to the basis of anatomy

[In 1542 the Surgeons, who had previously existed in London as one if not two distinct bodies or brotherhoods, were united without any very good reason beyond, perhaps, HENRY THE EIGHTH's pleasure, by act of Parliament, to the Barbers' Company of London, but they were only paired, not matched, as it appears that their Court of Assistants was equally divided between the two professions, the Barbers having their side, the Surgeons theirs, but neither interfering with the other's department This act of Parliament encouraged dissection by directing that "the masters or governors of the said mysterie" should have, "at their free liberty and pleasure," the bodies of four felons, "to make incision of the same * * * for their further and better knowledge, instruction, insight, learning, and experience in the said science or faculty of Surgery" From the destruction of the books it cannot be ascertained whether dissection was forthwith pursued, but, in 1566, public demonstrations and dissections were enacted by the Company of Barbers and Surgeons to be held in their hall at stated periods, and conducted by two masters and two stewards of the "anathomies" There was also a readership of anatomy at the hall, which was long held by physicians appointed by the Court of Assistants, but when instituted is doubtful WADD says that Dr WILLIAM CUNNINGHAM lectured there in 1563, but the first appointment I can find is that of Dr PADDY, who was appointed reader of the anatomy lectures on the 11th July, 1596

The study of anatomy does not seem to have been so little thought of at this time as generally believed, in proof of which it may be mentioned

that Sir EDWARD ARRIS, an alderman of London, who was also warden in 1642, and master of the Company of Barbers and Surgeons in 1651, founded on the 27th October, 1645, six anatomical lectures, to be publicly read every year between Michaelmas and Christmas, and endowed them with 300*l*, on condition that the Company should pay for the lectures 20*l* a-year subsequently he exchanged this sum for an annuity of 30*l* charged on his estates, and at a later period redeemed this charge by paying 510*l* to the Company, which was by them paid over at the dissolution to the Surgeons' Company, and, when the latter merged into the College of Surgeons, the same was handed over to them ARRIS's good example was followed by MR JOHN GALE, who, on the 30th June, 1698, founded one anatomy lecture every year, to be called GALE's Anatomy, and endowed it with a rent-charge of 16*l* a-year out of certain landed property, which was subsequently sold for 432*l* sterling, and the interest thereon now produces rather more than 20*l*. The two endowments are now consolidated, and the lectures on human anatomy and Surgery are called ARRIS's and GALE's Lectures
—J F S]

In this way, assisted by the advance of anatomy, was Surgery raised, by PARE, FRANCO, FABRICIUS HILDANUS, FABRICIUS AB AQUA-PENDENTE, SEVERINUS, and WIESEMANN, in the sixteenth century, to a high station

In the second half of the sixteenth century actually commences the brilliant period of Surgery. Numerous wars and the establishment of public hospitals presented a rich field for observation, and the foundation of the Academy of Surgery at Paris collected scattered powers and aroused a general emulation. In France shone out DIONIS, J L PETIT, MARESCHAL, QUESNAY, MORAND (a), LOUIS, LEDRAN, GARENGEOT, LAFAYE, LECAT, LAMOTTE, RAVATON, DAVID, POUTEAU, LEVRET, SABATIER, DESAULT, in England, WISEMAN, CHESELDEN (b), DOUGLAS, the two MONROS, SHARP, COWPER, ALANSON, POTT, HAWKINS, SMELLIE, and the two HUNTERS, in Holland, ALBIN, DEVENTER, CAMPER, in Italy, MOLLINELLI, BERTRANDI, MOSCATI, SCARPA, in Germany, HEISTER, PLATTNER, BILGUER, BRAMBILLA, THEDEN, RICHTER, C SIEBOLD, and MURSINNA.

By this general cultivation has Surgery been brought up in modern times to an elevation which cannot be displayed generally but only in the history of the several operations. Boldness grounded on the progress of anatomy and physiology, simplicity in the methods of treatment, and scientific culture, distinguish it.

The equal participation of all civilized nations in these efforts keeps up amongst them a contest for intellectual superiority in the ranks of improvement, while it makes any decisive award impossible.

(a) He was secretary to the Academy of Surgery, and, on the opening of the schools in 1743, delivered a most admirable address, "Discours dans lequel on prouve qu'il est nécessaire au Chirurgien d'être lettré," in which he shows the necessity of a literary education for a Surgeon, and mentions incidentally that the royal declaration founding the Academy, required "that the Surgeons of Paris should be Masters of arts before admission into the community, and that they should then pursue Surgery without mixing

any mechanics," "loi précieuse," says lie, "qui faisant une des époques les plus mémorables pour l'illustration de notre art, doit immortaliser celui (DE LA PEYROVIE) qui la sollicite et dont les titres éminens sont soutenus par un mérite supérieur" *Opus cules de Chirurgie*, p 118 Paris, 1768 4to

(b) He established the first School of Anatomy in London, independent of the Barbers' and Surgeons' Company, at St Thomas's Hospital about the year 1714

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FIRST DIVISION

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1 INFLAMMATION (*Inflammatio Phlogosis*, Lat , *Entzündung*, Germ , *Inflammation*, Fr) is that condition of an organized part in which the vital process and plasticity of the blood are unnaturally raised, and which is manifested by pain, redness, increased temperature, and swelling

The elevation of the vital process must be of a certain duration and intensity, that is, it must be actually diseased, when we apply to it the name *Inflammation*. Thereby, alone, is inflammation distinguished from the temporary condition of *active congestion* and increased *turgor vitalis*. The proximate cause of these phenomena is indeed the same as in inflammation, and may run into it. The same applies to the so-called inflammatory irritation.

[The term "inflammation" has been objected to by ANDRAL, (a), one of the most able French writers on pathology. He says — "Created in the infancy of science, this expression, (inflammation,) completely metaphorical, was destined to represent a morbid condition, in which parts seemed to burn, to inflame, as if they had been subjected to the action of fire. Received into the language, without any precise idea having ever been attached to it, under the triple relation of symptoms which announce it, of lesions which characterize it, and of its actual nature, the expression "inflammation" has become so vague, and its interpretation so arbitrary, that it has really lost all value. It is like a piece of old money without the impress, which must be put out of circulation, as it causes only error and confusion. Inflammation can only be considered as the expression of a complex phenomenon, comprehending many other phenomena, the dependence of which is neither necessary nor constant" (vol 1 p 9). He has, therefore, chosen to set aside the term "inflammation" as generally characterizing the phenomena we are about to consider, and has employed that of "hyperæmy," restricting it, however, only to that condition of the vessels in which they are loaded or congested with blood, from whatever cause, healthy or unhealthy, such condition may arise. JOHN HUNTER (b) seems to have anticipated these objections, for, he observes — "The term or idea of inflammation may be too general, yet it is probable that it may form a genus, in which there is a number of species, or it may be more confined in its classification, and be reckoned a species containing several varieties. These are, however, so connected among themselves, that we cannot justly understand any one of the species or varieties without forming some idea of the whole, by which means, when treating of any one, we can better contrast it with the others, which gives us a clearer idea, both of the one we are treating of, and of the whole" (p 265). The difficulty, however, is to distinguish the onset of the diseased action, inflammation, from the natural one, congestion or turgescence. Their close resemblance was first pointed out by HUNTER, who observes — "The very first act of the vessels when the stimulus which excites inflammation is applied, is, I believe, exactly similar to a blush. It is, I believe, simply an increase or distention beyond their natural (ordinary?) size. This effect we see takes place on many occasions. Gentle friction on the skin produces it, gently stimulating medicines have the same effect, a warm glow is the consequence similar to that of the cheek in a blush and, if either of these be increased or continued, real inflammation will be the consequence" (p 279). So ANDRAL — "Will anatomy establish any line of demarcation between physiological (healthy) and pathological congestion? No more than the latter can always be strictly separated from the complex phenomenon called "inflammation." Thus, under the influence of violent emotion, vessels appear on the conjunctive coat of the eye, and the lids become red. The same effect follows a grain of sand falling on the front of the eye, insensibly does the congestion increase from that almost normal condition in which vessels appear on the conjunctive coat to that when the mucous membrane of the eye, becoming uniformly red and considerably swelled, presents that variety of ophthalmia known as *chemosis*" (vol 1 p 13). The same language is held by MULLER (c) — "Inflammation begins, indeed, with phenomena which are similar to turgescence. The organs attract more blood than usual, in consequence of the altered affinity between the blood and the tissue, and obstructs its efflux, but we must be very cautious in calling increased vital action that important change caused by inflammatory irritation which produces functional disturbance, and has consequent to it an effort of nature to compensate an injury which has interfered with the action of the organ. Had the vital action been increased, so would not the morbid processes of inflammation have occurred," (vol 1 p 218). HUNTER also observes — "Though pure inflammation is rather an effort of nature than a disease, yet it always implies disease or disturbance, inasmuch as there must be a previous morbid or disturbed state to make such effort necessary" (p 260). Again — "Inflammation is to be considered

(a) *Precis d'Anatomie Pathologique*
(b) *On the Blood, Inflammation &c*

(c) *Handbuch der Physiologie des Menschen*

only as a disturbed state of parts which require a new but salutary mode of action to restore them to that state wherein a natural mode of action alone is necessary from such a view of the subject, therefore, inflammation in itself is not to be considered as a disease, but as a salutary operation, consequent either to some violence or some disease" (p 249) "Inflammation is not only occasionally the cause of diseases, but it is often a mode of cure, since it frequently produces a resolution of indurated parts, by changing the diseased action into a salutary one, if capable of resolution" (p 250) "Inflammation may first be divided into two kinds as first principles, viz , the healthy and the unhealthy The healthy probably consists only of one kind, not being divisible but into its different stages, and is that which will always attend a healthy constitution or part, is rather to be considered as a restorative action than a diseased one, and would rather appear to be an effect of a stimulus than an irritation The unhealthy admits of vast variety, (diseases being almost numberless,) and is that which always attends an unhealthy constitution or part, but principally according to the constitution however, many parts naturally have a tendency to run into inflammations of particular kinds * * The simple act of inflammation cannot be called specific, for it is a uniform or simple action in itself, but it may have peculiarities or specific actions superadded Inflammation is either single or compound it may be called single when it has only one mode of action in the part inflamed, as in its first stages, compound, when attended with another mode of action, or when it produces other effects" (p 251)]

2 All organs of the body may become inflamed except the cuticle, hair, and nails The disposition to become inflamed depends on the number of nerves and capillary vessels in a part The actual seat of inflammation is always the capillary-vascular system, and the ganglionic-nervous system, accompanying the most delicate branches of the vessels, which specially presides over vegetation in the organism

["Inflammation," says HUNTER, "may arise from very different causes, and often without any apparent cause, and its operations are far more extensive than simply the act of producing union in parts divided by violence" (p 248) "Susceptibility for inflammation may be said to have two causes—the one original, the other acquired The original constitutes a part of the animal economy, and is probably inexplicable Of the acquired, it is probable that climate and modes of life may tend considerably either to diminish or increase the susceptibility for inflammation The influence, however, of climate may not be so great as it commonly appears to be, for it is generally accompanied by modes of life that are not suited to others" (p 226) "Inflammation, when the constitution is strong, will be commonly the most manageable, for strength lessens irritability, but in every kind of constitution inflammation will be the most manageable where the power and the action are pretty well proportioned, but, as every part of the body has not equal strength, these proportions cannot be the same in every part of the same constitution According to this idea of strength, the following parts—viz , muscles, cellular membrane, and skin,—and more so, in proportion as they are nearer to the source of the circulation—will be most manageable in inflammation and its consequences, because they are stronger in their powers of action than the other parts of the body The other parts, as bone, tendon, ligament, &c , fall into an inflammation, which is less in the power of art to manage, because, though the constitution is good, yet they have less powers within themselves, and therefore are attended with the feeling of their own weakness, and I believe they affect the constitution more readily than the former, because the constitution is more affected by local disease, when the parts have less power within themselves of doing well, and the effects, if bad on the constitution, reflect a backwardness on the little powers they have * * * The inflammation, if in vital parts, will be still less manageable, for, although the parts themselves may have pretty strong powers, yet the constitution and the natural operations of universal health become so much affected, that no salutary effect can so readily take place, and therefore the disease becomes less manageable * * * In weak constitutions, although the inflammation be in parts which admit of the most salutary operations, in the time of the disease, and in situations the most favourable to restoration after disease, yet the operations of inflammation are proportionably more backward as to their salutary effects in such constitutions, and more or less, according to the nature of the parts affected" (pp 228, 9)]

3 Inflammation always commences with a more or less intense pain; the sensibility of the part is increased, redness soon follows, and blood appears in vessels where previously it had not been observed, the temperature of the part is raised, its functions disturbed, secretion suppressed, (at least at first,) or changed, perspiration diminished, and the part swelled These appearances are developed, in different proportions, to a higher degree, in which fever (*Febris inflammatoria secunda*) usually becomes connected with them

[I apprehend it would be more correct to say "that inflammation, from its very commencement, is always accompanied with a more or less intense pain," than to say, with our author, it "always commences with a more or less intense pain," inasmuch as, though that by which the patient's attention is first excited, yet it is only an indication of a disturbance set up in the economy, and which, as it becomes greater, renders itself apparent to the eye, most commonly by redness —J F S

Dr ALISON (a) observes —"In order to give the requisite precision to the general notion of inflammation as a local change of the condition of any part of the body, it seems only necessary to include in it, besides the pain, swelling, heat, and redness, the tendency always observed, even when the changes in question are of short duration, to effusion from the blood-vessels of some new products, speedily assuming in most instances the form either of coagulable lymph or of purulent matter" (vol 1 p 53)]

4 The pain depends on the increased activity of the nerves (1,) and this again produces the succeeding increased influx of the blood, and the vital expansion of the vessels (2,) afterwards the pain is increased by the decided expansion and tension which the part suffers It differs according to the degree of inflammation and the sensibility of the affected part often it consists only in the sensation of prickling, itching, tickling, and a troublesome stretching, often is it stabbing, tearing, burning, and, in structures largely supplied with nerves, it attains a most vehement degree (3)

The redness, heat, and swelling, depend on the increased action of the nerves and capillary vessels, and is in immediate relation with the richness of their ramifications Hence the various degrees of redness, heat, and swelling, according to the degree of inflammation and the organs therewith affected At the onset of the inflammation the swelling always depends on an increase of blood The reddening of the blood (4) and evolution of warmth are attributes of the living process they must, therefore, be also increased by its greater activity According, however, to experiments with the thermometer, the warmth in inflamed parts is not so considerable as to our touch it seems to be (5) Where the most delicate branches of the capillary-vascular system anastomose to form the transition into the veins, several capillary vessels always open together into one single vein By this disposition of the capillary-vascular system there is already in the healthy state a slower motion of the blood, which is in close relation to the functions of the capillary-vascular system If, then, in inflammation there be an additional influx of blood, there must arise with the *increased activity* of the capillary-vascular system and vital expansion (6) an accumulation of it, (the blood,) as the veins are not in a condition to take up and carry away with equal readiness the blood which is brought to them in excess The capillary vessels become therefore expanded, as if filled by artificial injection, and even

distinct in those parts where we assume that in the natural state vessels carrying only the uncoloured part of the blood exist in the subsequent course of the inflammation new vascular branches are formed. The cellular tissue is the most especial seat of the development of vessels. These occurrences are the cause why the inflammation, which at first was to be considered merely as a dynamic disease, brings about distinct changes in the structure of organs. The increased activity of the nerves and capillary-vascular system produces a more copious infiltration into the cellular tissue than in the natural state, a part of the serum—in some cases even of the red part of the blood—penetrates through the expanded walls of the vessels, and empties itself into the cellular tissue. The walls of the cells are, therefore, in this case, found thickened, filled with a serous, albuminous, often bloody fluid, in which frequently albuminous flakes float or are connected with the walls of the cells. The changed condition and increased plasticity of the blood is shown by the *crusta inflammatoria*, which consists of the fibrin of the blood.

According to the different degree of irritation, and the consequent reaction of the nervous system, so long as, excepting the pain, no other appearance of inflammation exists, (which condition many consider as the forerunner of inflammation,) there is produced a spasmodic contraction with accelerated motion of the blood in the small vessels, upon which first follow their vital expansion, the greater influx of blood, and the other phenomena of increased living actions (7). A comparison may therefore be instituted between these local appearances and those coming in with inflammatory fever. As we have there contractions of the vessels and obstruction of the circulation, so we have here chilliness, contraction of the skin, small pulse, which are followed by the phenomena of vital expansion of the vascular system, increased warmth, and so on. In the commencement there is in a manner present an inflammatory spasm—the vascular system is entirely controlled by the nervous system. With the increased influx of the blood, and its accumulation in the capillary vessels, is the previously quickened motion of the blood-corpuscles retarded, the capillary vessels, by the consequent evaduation of the serum, become completely filled with blood-corpuscles, and an actual stagnation, an inflammatory stasis ensues, but which is not to be considered as a passive over-filling.

[1] But what causes this increased action of the nerves? The squeezing and stretching of the minute nerves of the part, by the increased size of the capillary vessels, resulting from the obstruction of the current of blood through them, which occurs at the very onset, and which, indeed, is, as will be presently shown, the first step of the inflammatory process. TRAVERS (a) considers "the pain of inflammation directly or indirectly connected with the state of the blood-vessels," and it is, probably, the nerves of the blood-vessels that are first excited in the pain of inflammation" (pp 46, 7). This opinion is corroborated by referring to JOHN HUNTER's observations on the passage of the adhesive to the suppurative inflammation, in which he says, "The pain is increased at the time of the dilating of the arteries, which gives the sensation called throbbing, in which every one can count his own pulse, from paying attention merely to the inflamed part, and perhaps this last symptom is one of the best characteristics of this species of inflammation" (p 378). And in a previous passage he had observed—"Whether this pain arises from the distention of the artery by the force of the heart, or whether it arises from the action of distention from the force of the artery itself, is not easily determined" (p 287). The throbbing, however, is not entirely confined to suppurative, but also accompanies acute, inflammation, and TRAVERS has well observed—"Throbbing, lancinating or pulsatile pain,—i.e. pain accompanied with a sense of motion of the fluids in the part,—is the most characteristic distinction of acute inflammation, and an obtuse, aching, or heavy pain belongs to a congested state of the local circulation." And he also points out that "the description of pain unattended with inflammation, diff. from the pain of inflammation, although the former is subject also to varieties, kind, duration and intensity," observing that "Neuralgia is generally attended mor-

or less with muscular cramp or spasm, and such pain is either intermitting or periodical," and that such medicaments "as relieve pain in the absence of inflammation have little or no beneficial effect on the pain of inflammation. Blood-letting aggravates neuralgia and relieves inflammatory pain. Steel and arsenic aggravate inflammatory pain, and cure neuralgia" (pp. 45, 6.)

(2) According to his neuropathological theory, HENLE (*a*) asserts, that "it is through the nervous system that the exciting cause of inflammation operates, by suspending the nervous influence from the small vessels, and consequently determining relaxation of their walls with dilatation of their calibre" (p. 578.) The mode of action of the exciting cause he describes as follows—"The exciting cause, of what nature soever it may be, whether external or internal, acts primarily on sensitive nerves, exalting their activity. The motor nerves of the vessels which have sympathetical relations with the excited sensitive nerves, are secondarily affected. But this affection of the motor nerves of the vessels, which supervenes by reflex action on the excitement of the sensitive nerves, is not a corresponding state of excitement, but an opposite one of depression, of suspension of action, of paralysis. This form of sympathy, on which the state of excitement of one nerve determines depression of another, HENLE calls *antagonism*, when to that in which a state of activity of one nerve is called forth by a corresponding state of another, he applies the term *sympathy* in a more restricted sense than generally employed. The latter form is more common in the domain of the cerebrospinal system, the former in that of the ganglionic system, the source of the nerves of the vessels. Sometimes, however, sympathy is exemplified in the vessels by constriction supervening on irritation and preceding dilatation; but, in most cases, relaxation and dilatation of the vessels from suspension of nervous influence, are the primary effect of the irritation, no matter whether that irritation have been violent or moderate. Hence HENLE contends that the relaxation of the vessels, on which their dilatation depends, cannot be a mere consequence of exhaustion of the vessels from previous action, as suggested by ALISON and BILLING, but can only be antagonistic" (p. 582.)

As to the cause of inflammation HUNTER observes—"I will venture to say, that any cause which can obstruct the motion of the blood for a given time, will become the cause of inflammation, for, either the cause of the obstruction itself, or the blood being retained in the smaller vessels for a certain time, will either irritate or unite the parts, or, where it irritates, will throw the vessels into such actions as naturally arise out of an extraneous irritating cause, but not an increased motion of the blood behind, to drive on the obstructed blood through these vessels, as has been supposed" (p. 259.) The truth of these views is fully borne out by the observations of more recent inquiries, some of which will be presently detailed.

(3) In reference to the pain in inflammation, HUNTER also notices that, as "Many parts of the body in a natural state give peculiar sensations when impressed so when they are injured they give likewise pain peculiar to themselves," of which the pain caused by squeezing or inflammation of the testicle is a good example. "And I may also observe," he says, "that the same mode of impression shall give a peculiar sensation to one part, while it shall give pain to another thus, what will produce sickness in the stomach, will produce pain in the colon" (pp. 288, 9.)

TRAVERS makes a remark showing that pain is not necessarily an attendant on inflammation, which is well worth remembrance, and with which few careful observers will not accord. "We are told," says he, "there can be no inflammation where there is no pain. I reply, that there are many, and destructive too, a joint, an eye, nay, the lungs may be destroyed by inflammation without pain, he is a speculative, not a practical, pathologist who does not know this. It would be easy to superinduce pain in either of these cases, but let there be no interference, and the work of destruction in numberless cases is as silent as it is sure" (p. 29.)

(4) Touching the redness, HUNTER observes—"It is of various hues, according to the nature of the inflammation if healthy, it is a pale red, if less healthy, the colour will be darker, more of a purple, and so on, till it shall be a bluish purple, * * * it is gradually lost in the surrounding part if the inflammation is of the healthy kind, but in many others it has a determined edge, as in the true erysipelatous, and

(*a*) I have made use of the Digest of this *Anfang des Jahres*, 1839, in WHARTON JONES's Author's *Pathologische Untersuchungen*, excellent Report on the Theory of Inflammation, 1840, and of his *Bericht über die Arbeiten im Gebiet der rationellen Pathologie seit 1840*, in FORBES's *British and Foreign Medical Review*, vol. viii, 1844—(J. F. S.)

in some specific diseases, as in the small-pox" * * * "This increase of red appears to arise from two causes the first is a dilatation of the vessels, whereby a greater quantity of blood is allowed to pass into those vessels which only admitted serum or lymph before, the second is owing probably to new vessels being set up in the extravasated uniting coagulating lymph" (p 283, 4)

TRAVERS thinks that the intensity of the redness depends "on the degree of fulness (of the vessels) compatible with motion, for, although the oxygen of the atmosphere will redden the blood in the congested vessels of the surface, while circulation, however imperfect, continues, from the commencement of the state of absolute stagnation, the colour gradually undergoes a change from pink to purple In some modes of inflammation this shade of colour prevails even from the beginning, and soon turns to livid" * * * These varieties are due to the state of the general circulation, which gives its character to the inflammation, and an attending change in the constitution of the blood" (p 50)

(5) JOHN HUNTER observes on this point—"From all the observations and experiments I have made, I do not find that a local inflammation can increase the local heat above the natural heat of the animal" The experiments he made were, 1 in the inflamed cavities of hydroceles, in which the thermometer stood at $98\frac{1}{2}^{\circ}$ F, an increase ended of $6\frac{1}{2}^{\circ}$ on the natural heat ascertained prior to the inflammation, but, as HUNTER states, "not equal to that of the blood probably at the source of circulation in the same man" 2 in a wound of a dog's chest, in which before and after inflammation the heat was 101° 3 in a wound in the gluteal muscles of an ass 100° before, and varying from 99° to $101\frac{1}{2}^{\circ}$ after inflammation 4 in the vagina of an ass from $99\frac{1}{2}^{\circ}$, as before the inflammation to $100\frac{1}{2}^{\circ}$ In other experiments on mucous surfaces the heat was sometimes the same as before the inflammation, and sometimes increased 1° or 2° " (p 293 to 300) "But," as says TRAVERS, "the nerves measure the sensation rather than the degree of heat, and this is a widely different scale from those of Fahrenheit or Reaumur, * * * this determination of blood to the capillaries in blushing is accompanied with a distinct though transient sensation of burning heat to the individual, yet not such as could be ascertained by the most delicate thermometer It is most probably to be referred to the extraordinary inlet of arterial blood into the capillaries its longer detention by the congestion proper to inflammation, and the consequent increase and vigour of the neighbouring circulation would give permanency to the sensation, and render the actual increase of temperature appreciable" (pp 48, 9)

(6) In reference to the enlargement of the vessels of an inflamed part, and its visibly-increased vascularity, HUNTER observes, that, "instead of an increased attraction, there was rather what would appear an increased relaxation, of their muscular powers, being, as we might suppose, left to the elasticity entirely This would be reducing them to a state of paralysis simply but the power of muscular contraction would seem to give way to inflammation, for they certainly dilate more in inflammation than the elastic power would allow and it must also be supposed that the elastic power of the artery must be dilated in the same proportion" And he comes to the conclusion, "When we consider the whole of this as a necessary operation of nature, we must suppose it something more than, simply, a common relaxation we must suppose it an action in the parts to produce increase of size, to answer particular purposes, and this I should call the action of dilatation" (p 282)

(7) This is pretty nearly the opinion of Dr CULLEN, who taught that spasm of the extreme arteries supporting an increased action in the course of them, may be considered as the proximate cause of inflammation, at least in all cases not arising from direct stimuli applied, and, even in this case, the stimuli may be supposed to produce a spasm of the extreme vessels

The following is a brief account of Dr JOHN THOMSON's (a) observations on the variation of the current of the blood through the capillaries, resulting from the application of different substances—"Weak and strong spirits of wine were applied to the smallest arteries of the web in eight or nine different frogs, but without being able to perceive any sensible change in the diameters of the arteries to which the spirits were immediately applied, though the general circulation through the web seemed to be increased by each application of the spirits The results were the same when the tincture of opium was employed" Weak volatile alkali, or am-

nia, produced "a complete contraction in the arteries to which it was more immediately applied. In upwards of one hundred experiments the contraction produced took place in *less than two* minutes after the application of the ammonia. In thirteen experiments contraction did not take place till after a period of *three* minutes. In three or four instances only, in which the ammonia was applied, were the contractions not induced" (p 83) "In some instances I thought I could perceive an increase of the velocity of the general circulation immediately after the application of the ammonia, in others, this increase, if it took place, was so small as to be imperceptible but the first and most remarkable visible effect of the contraction of the artery from the application of ammonia was a diminution of the velocity of the circulation in the capillary vessels with which the contracting artery communicates. When the contraction is complete, a temporary stagnation in the capillaries with which the contracted artery immediately communicates is often produced * * *. In all these experiments, in which ammonia alone was applied, a paleness rather than redness of the web in the foot of the frog was produced, but this paleness was only of short duration" (p 84) "In applying a saturated solution of common salt to the arteries in the web of the frog's foot, I was not a little surprised to observe that these arteries, instead of being contracted as they had uniformly been by the application of the ammonia, were actually and sensibly dilated. The part of the web to which the salt was applied became of a red colour, and this redness, which was visible to the naked eye, lasted in general from a period of three to five or more minutes. It was impossible to view the part with the naked eye, without conceiving it to be inflamed." THOMSON hoped, from "the facility of producing, by the application of salt, a state so accurately resembling inflammation that, by examining the phenomena of the circulation in this state, he should be able to arrive at some satisfactory conclusions with respect to the comparative velocity of the blood in healthy and in inflamed vessels, but he did not upon trial find this so very easy as he had at first imagined" (p 85) "The principal difficulty in ascertaining the comparative velocity of the blood in the sound and in the red or apparently inflamed parts arose from the very variable results which the application of salt produced in different animals, and in the same animal, in different circumstances." Thus, in nine cases, "the application of the salt was not only followed by a bright red colour visible to the naked eye, and a sensible enlargement of the arterial and venous branches, but with an increased rapidity of circulation also in the capillary vessels * * *. The repeated application, however, of the salt of the same vessels was always sooner or later followed by retarded capillary circulation, or even by complete stagnation." A second general result from the application of the salt was an apparent increase of circulation in the arteries and veins, with a diminution of velocity in the capillary branches * * *. In no one experiment have I been able to perceive any enlargement of an artery during the momentary influx of blood into its canal. The third and most frequent result from the application of salt was diminished rapidity of circulation in arteries, veins and capillaries. In seventeen experiments the circulation became so slow as to stop altogether in the capillaries, and this stagnation, which usually goes off in a few minutes, continued in some instances for several hours. The enlargement of diameter in arteries, veins, and capillaries is very conspicuous they may be said to be distended * * *. In every experiment with salt, whether the velocity of the circulation was increased, diminished, or stopped, the diameters of the blood vessels were uniformly enlarged, and this increase of diameter continued till the redness spontaneously disappeared" (pp 86, 7). From these observations THOMSON comes to the conclusion, that, "If this view of the state of the circulation in inflamed vessels be just, it will follow that inflammation is sometimes attended by an increased, and at others by a diminished velocity in the circulation through the capillary vessels of the inflamed part, and, consequently, that neither of those two states ought to be included in the definition which we give of inflammation" (p 88). These experiments and conclusion of Dr THOMSON are mentioned, because they are the first by which the condition of the vessels and the state of the circulation under inflammation have been attempted to be explained but they are inconclusive, for, as observed by J W EARLE (a), "although that state of parts which was induced by the application of salt, viz retardation and stagnation of the blood, presented the strongest resemblance to inflammation, yet in no one instance did either

(a) On the Nature of Inflammation, &c

state continue for a sufficient length of time to allow any one of the usual accompaniments of inflammation (to wit, the effusion of lymph or pus, or mortification) to be produced, since each variation terminated more or less speedily in the restoration of the natural current" (p. 40.)

Dr W PHILIP (*a*) applied "to the web of a frog's foot, placed under a microscope, distilled spirits, and in a few seconds observed the blood in all the vessels moved with a greatly increased velocity, which, as he constantly kept the web wet with the distilled spirits, continued as long as he observed it, ten minutes or a quarter of an hour, but during no part of the time could he perceive the slightest symptom of inflammation, either with or without the microscope. The vessels, instead of appearing redder and more turgid, were evidently paler and smaller than before the application of the spirits." (p. 30.) Hence it appears that his experiment does not in its result tally with THOMSON's, who at first did not observe any increased velocity, nor ever any sensible change in the diameter of the arteries. It is probable that in neither case did the spirit operate beyond constricting the parts by the cold its evaporation produced. In another experiment, however, inflammation was produced in the web of a frog's foot, and then Dr W PHILIP (*b*) "found the vessels of the part greatly dilated and the motion of the blood extremely languid. In several places where the inflammation was the greatest, the vessels were most distended and the motions of the blood were slowest" (p. 15.) He therefore considered that in inflammation the blood vessels were in a state of debility.

The account given by GENDRIN (*c*) of the steps by which the stagnation of the blood in inflammation is produced is very interesting—"The capillaries around this (irritated) point dilate, and seem to multiply themselves, because a greater number is perceived on account of the presence of red blood, which, in colouring them, renders them more visible. The globules arrive, they are crowded together, their motion is retarded, and at length suspended, they revolve upon themselves, and at last remain entirely at rest. The capillary circulation is then evidently suspended in the point irritated, for some distance around, the retardation of the circulation and dilatation of the capillaries are plainly seen, a little farther off the circulation is more rapid, the capillaries being still dilated, and the globules of the blood less distinct, finally, at the limits of the inflamed areola the circulation is, on the contrary, accelerated, the capillaries dilated, and the blood contains a greater number of globules. All these changes may take place in four or five minutes, and the same space of time is sufficient to allow of the capillary circulation returning to its natural state" (vol. II p. 475.) The objection made by EARLE to THOMSON's experiment, that inflammation had not been excited, might perhaps, strictly speaking, be made use of here, but it is quite clear that the experiment had reached the turning point from healthy to diseased action.

THOMSON's experiments have been repeated and detailed by TRAVERS, in his chapter, *Direct Effects of Stimuli and of Wound*, and all coincide in producing the same phenomena, excepting that with ammonia, in which TRAVERS's observations are remarkably opposed to those of THOMSON, for "the application of ammonia," says he, "produced an instant increase of velocity, then stagnation, with the deepened tint of colour and enlargement of vessels" (p. 36.)

TRAVERS gives a very beautiful account of "the oscillation attending the recovery of the circulation, which seems to be the *punctum saliens*, or first movement towards the formation of the new circulation" (p. 166.) * * * "The first effect of a drop of stimulant fluid, or of a wound upon a transparent web, (frog's foot,) as seen in the field of a powerful microscope, is," says he, "to arrest the circulation at the part. Around the point of absolute stagnation, the column of blood oscillates, and the particles are seen to separate and congregate in small irregular masses, presenting varieties of shape, some being perfect ellipses, others spherical. The vessels are dilated, and, in proportion, their fulness is increased, and their pink colour heightened. Still more remote from the stagnant centre increased activity of circulation prevails. The point of stagnation, the very slow circulation in the part immediately surrounding it, the current still oscillating in parts, and beyond this the more rapid and vigorous circulation, are manifested for several days. The con-

(a) An Experimental Inquiry into the Laws of the Vital Functions London, 1826 4th Edit. London, 1820
matic Fevers, including Inflammations, &c.

Svo

(c) Hist Anat des Inflammations

(b) Introduction to a Treatise on Sympto-

trasted appearance of one portion of the web stationary, and another in brisk circulation, is striking. The labour also of the current, the sudden overcomimg of the obstacle occasioned by a too crowded passage, and the instant velocity succeeding thereupon, remind us of the swaying backward and forward, and at length the inrush, of a crowd emerging into an open space from a narrow avenue" (p 34, 35.)

BENNETT says—"It is very difficult to determine the cause of oscillation in the column of blood. It may be remarked, however, that this phenomenon has only been observed in the smaller animals which are held fast under the microscope. Even here the oscillation is not invariably seen to precede the stoppage. It is most frequently observed, also, when the animal is very weak, or has fallen into asphyxia. Under such circumstances the energy of the heart and large vessels is evidently diminished, and the blood will be propelled with less force than usual against the capillaries, and either stop for a moment, or flow backwards during the diastole of the heart. It is probable, therefore, that the oscillation does not essentially belong to inflammation, but rather depends upon the general weakness of the animal" (p 33.)

The phenomena attending the first steps of the inflammatory process excited in the web of a frog's foot, as seen under the microscope, are well described by WHITTON JONES (a) "Very soon after the irritation," he says, "accumulation and stagnation of the blood in the capillaries, including the terminations of the arteries and radicles of the veins of the part, is observed to take place, but amidst the obstructed vessels a few here and there may still be seen pervious, and through them the stream of blood is very rapid. The accumulation and stagnation of the blood in the small vessels is always preceded by a retardation of its flow (coincident with dilatation of the vessels,) this retardation of the flow of blood having or not been preceded by the opposite condition of an accelerated flow (coincident with constriction of the vessels") He then proceeds to inquire into "the behaviour of the blood during the retardation of its flow and at the time of its stagnation," which he thus describes—"a *Colourless corpuscles*. During the retarded flow of blood immediately preceding stagnation, an accumulation of colourless corpuscles is observed to take place on the inner surface of the walls of the dilated small vessels, similar to what occurs in the healthy state when the velocity of the stream of blood is diminished b *Red corpuscles*. While the accumulated colourless corpuscles may have even become stagnant on the walls of the vessels, the red corpuscles, though in increased quantity, in proportion to the plasma, still continued to float on, but more and more slowly until complete stagnation ensues. They are somewhat more collapsed than natural, hence they appear redder, and their nucleus is less indistinctly seen, a change similar to what takes place in the red corpuscles of newly drawn blood. The red corpuscles appeared to be the agents principally concerned in the stagnation of the blood * * * by agglomerating together, and applying themselves here and there flat against the walls of the vessels and adhering to them, whilst other red corpuscles applied themselves to those already adherent" (p 568, 9.) This view had been already put forward by JONES in 1812, and about the same time was described more at length by EMMERT and by VOGEL. The following is the brief account which JONES gives of their statement. According to EMMERT the colour of the red globules becomes somewhat deeper, and hence individually they appear less transparent, their surface is less smooth, and the irregularity of their edges is peculiarly distinct they acquire the property of remaining adherent to each other and to the walls of the vessels when they come in contact with them. When the flow of blood becomes retarded and oscillations commence, the blood-corpuscles apply themselves, according to VOGEL, more to each other, and, though still individually distinguishable, they still touch, and in the smaller capillaries are often pressed close together by their surfaces in the manner of rolls of coin. The space next the walls seems merely filled with plasma, but, in complete stagnation of the blood, it disappears, and the interior of the vessel is completely filled with blood-corpuscles closely aggregated, and forming an apparently homogeneous indistinctly granular mass, in which individual blood corpuscles can scarcely be distinguished but this fusion is merely apparent, for, if the blood be evacuated by opening the vessels, the individual corpuscles again appear quite distinct" (p 568)—J F S]

5 Every injury which acts as an irritant upon any one organic part, may be considered as an incidental cause of inflammation. The necessary intensity of this irritation cannot, in general, be determined, it depends upon the individual susceptibility and condition of the organs. Powerful, young, full-blooded, sanguine, or choleric subjects, are most prone to inflammation, the disposition to which is strongest when the fibrin of the blood is increased in quantity. Inflammation arises most readily in parts which are very sensitive, and in which the capillary-vascular system is much developed. The usual incidental causes of inflammation are, a peculiar condition of our juices differing from the natural commixture, suppression of ordinary discharges, contagious matter, mechanical influences, falls, blows, wounds, and so on, cooling after preceding heat, burning by fire, corroding substances, and so on.

[To these we may also add, with JOHN HUNTER, "that fever is often the cause of local inflammation. We see this happen every day * * *. These inflammations, in consequence of fever, are commonly supposed to be critical, but I very much doubt the truth of this opinion" (p 257)]

"Irritating substances," says JOHN HUNTER, "when of no specific kind, produce inflammation sooner than other visible causes of inflammation. If of a specific kind, then the time, sort, and violence will be according to that kind. But irritating applications must be continued for some time to produce violent inflammation. These differences are easily accounted for quick death does not irritate the part killed, and the contiguous living part, not being itself hurt, is only irritated to get rid of the dead part. A wound is a quick irritation of a living part, so that it inflames more readily and more violently, according to the quantity of irritation, but that cannot be of long standing, as nature sets about procuring relief. But when irritating substances are applied, the part inflames quickly, according to their power of irritation, and, if they are continued, nature is not allowed to relieve herself, but is constantly teased, by which means the inflammation becomes also violent" (p 257). "All inflammations attended with disease have some specific quality which simple inflammation has not, and in such cases it is the specific quality which is the disease, and not the inflammation" (p 260). "There are many constitutions which have a tendency to specific diseases, that, when injured by fever or any constitutional complaint, readily produce the specific inflammation in such parts of the body as have the greatest susceptibility for any specific action, or, if such parts are affected by any local violence, the parts affected will not go through the healthy adhesive inflammation, nor will they enter into the healthy suppurative inflammation, but will fall into the specific inflammation peculiar to the habit such is the case with an erysipelatous habit. Or, if a specific inflammation has already taken place, any violence done to it, when already begun, will increase that disposition and action, which we plainly see to be the case with the scrofula, because this disease can, and often does, arise from such a cause alone" (p 261).

6 The results of inflammation are *resolution*, *exudation*, *suppuration*, *ulceration*, *induration*, and various other transformations of organs, *softening*, and *mortification*. All these conditions, excepting resolution, are merely different living processes, which are brought about by inflammation, and are still accompanied by it for a long time.

7 In Resolution (*Resolutio*, Lat., *Zertheilung*, Germ., *Résolution*, Fr.) the appearances of inflammation subside nearly in the same order as in their development they set in with, and the diseased part reverts to its natural condition. The pain diminishes, or disappears first, in the same degree the temperature and the redness lessen, the swelling alone often remains for a still longer time, till the absorption of the serous or albuminous fluid poured into the cellular tissue is completed.

We may hope for this result when the inflammation has not quickly

run on to a great extent, the pain neither particularly severe nor throbbing, and when the fever accompanying the inflammation terminates critically in perspiration and deposit in the urine

Resolution is distinguished from the *disappearance* or *recession* (*Verschwinden oder Zurücktreten*, Germ., *Décliscence*, Fr.) of inflammation, which is in general connected with its simultaneous or speedy development in another organ. This recession depends on the succession of an irritation which is more severe than that which kept up the earlier inflammation. It is often merely a state of *changed vital activity*, of increased sensibility, which produces the removal of the inflammation, particularly if it be treated with repelling astringent remedies. Certain inflammations, as *crysipelas*, and critical inflammations, have a peculiar disposition to recede.

[The process of resolution has been well described by Dr J H BENNETT, as follows—"Resolution or absorption of the exudation may occur in various ways, and follow any of the transformations of the exudation except the one which converts it into permanent tissue. The early phenomena first disappear, the capillaries recover their contractility, the attraction between the blood and the parenchyma ceases, and the blood within the vessels begins to oscillate, and at length flows in a continuous stream. Secondly, the essential phenomenon disappears, no further exudation takes place, and that already poured out is absorbed. It occasionally, though rarely, happens, that the exudation does not coagulate for some time after it is exuded. Under these circumstances, when the early phenomena terminate, it re-enters the vessels by endosmosis, unchanged. In the majority of cases, however, it coagulates, and, once rendered solid, it could never be absorbed without the occurrence of changes in it by which it is again rendered fluid. This is effected by the formation, ripening and disintegration or decay (moulting process of SCHULZ) of nucleated cells, whereby the coagulated exudation is broken up, made soft, pulvaceous, and diffusible, and at length absorbed. By this process exudation poured out into the lung or brain gradually disappears, by the production of inflammatory softening. On the serous surfaces the fluid and broken down corpuscles are absorbed, but that portion which passes into permanent organization, is transformed into fibrous tissue, becomes covered with a smooth membrane, so that the functions of the organ are not disturbed. Abscesses when resolved undergo a similar process. The pus-cells, instead of being evacuated, are brought closely together from the absorption of the more fluid portion (*liquor puris*). These are gradually broken down, the cell-walls are dissolved, and the whole is reduced to a molecular matter, which re-enters the vessels, and thus complete resolution is produced. The disintegration of pus-corpuscles previous to absorption is evidently favoured by the pressure which the abscess receives from the contraction of the filamentous and elastic tissues that form its walls * * *. It is probable also, by increasing the contraction of the integuments, as well as by removing fluid from the neighbourhood of the part, that irritants, blisters and cauteries, are so beneficial in the resolution of abscesses. It is suggested by ZIMMERMAN, that the formation of an acid, as the lactic, in abscesses when fully formed, favours their disintegration. We have seen that acetic acid dissolves the cell-walls and causes the nucleus to appear in the form of granules. If lactic acid be produced, it would probably have the same effect. Alkaline solutions also, it is well known, dissolve pus-corpuscles, a circumstance that may explain the discutient effects of alkaline lotions and washes, and their beneficial operation in removing the incrustations from eruptive pustular diseases"] (p 63-5)

As to the question "What becomes of the molecular fibrin which thus re-enters the circulation?" BENNETT, states that "the observations of several German physicians, more especially of SCHONLEIN and ZIMMERMAN, have thrown much light upon it, and determined that the changes which the urine undergoes in acute inflammatory diseases, bear a relation to the absorption of exuded blood-plasma in internal organs. Thus, in a case of pneumonia, SCHONLEIN pointed out that the disappearance of dullness was accompanied by a turbid state of the urine, which contained a large amount of molecular fibrin, and was also highly coagulable by heat. ZIMMERMAN has recorded instances where the turbidity and coagulability of the urine bore a marked relation to the diminution of suppurative swellings. In some cases where purulent matter was apparently absorbed, he had only observed that the urine was coagulable from the presence of fibrin dissolved in it" (a). Hence it is concluded "that the

(a) Ueber den gerinnbaren Harn, in CASPER's Wochenschrift, 1843, p 345

molecules of the broken-up exudation, after circulating in the blood, are frequently eliminated by the kidneys, and make their exit from the system by the urine, sometimes entire, at others in a state of solution * * * Occasionally the excess of fibrin may be eliminated by the skin, lungs, and bowels In all cases it constitutes an important symptom of the crisis" (p 65)]

8 Exudation (*Exsudatio*, Lat , *Ergießung*, Germ , *Easudation*, Fr) is the outpouring of a larger quantity of serous fluid than the capillary vessels ordinarily exhale into the cellular tissue, into the parenchyma of organs, or into the cavities of the body For the most part it occurs towards the end of the inflammation, or at least when it is subsiding The fluid poured out (serum and coagulable lymph) differs in respect to its composition , often thin and transparent, often consistent, mingled with flocculi, and so on The thicker part of this exudation (the coagulated albumen) not unfrequently unites neighbouring parts, vessels are prolonged into this interstitial substance, and adhesion is effected If the fluid poured into the cellular tissue be only serous, then *droopsical swelling* (*œdema*) is produced The exudation occurs, especially often in serous membranes not unfrequently also does a similar exudation accompany inflammation of the mucous membranes These exudations may be accompanied by an inflammatory or weakly condition of the capillary vessel

[The term "exudation," as here explained by our author, is synonymous with "effusion," as generally employed by British practitioners, but the latter, by defining the nature of the matter poured out as effusion of serum, of coagulable lymph, &c , make a distinction which the former does not Neither of these terms, however, thus used, seem sufficiently pointed, but their employment as proposed by J HUGHES BENNETT is unobjectionable "Effusions," he says, "no doubt are very common, but, in the great majority of instances, they arise from venous obstruction, altogether independent of inflammatory phenomena * * * In all such cases the fluid is clear, holds no fibrin in solution, and on being evacuated shows no disposition to coagulate * * * In inflammatory effusions, on the other hand, the fluid is more or less turbid, containing fibrin in solution, and if allowed to stand, flocculi swim in it, or sink to the bottom of the vessel * * * Mere effusion, then, cannot itself be considered as characteristic of inflammation It may be the result of congestions non-inflammatory, or, if otherwise, passes more or less into exudation In every instance of undoubted inflammatory action an *exudation* of blood-plasma occurs which may be made visible * * * Where the *liquor sanguinis* is poured out into shut cavities, the same phenomena occur as when blood is drawn from the body The fibrin coagulates, and the serum is set free The former then lines the serous membrane, and is denominated coagulable lymph, whilst the latter is called serous effusion * * * In parenchymatous tissues, however, as in the lungs, liver, brain, &c , the structure of the parts will not allow of this distinct separation The *liquor sanguinis* exuded is, of course, at first fluid, and, in this state, insinuates itself among the elementary structure of the organs, filling up every minute space When it coagulates, the tissues of the part affected are completely blocked up, as if with cement The blood-vessels, nerves, filaments, &c , are surrounded by a solid mass, in the same manner that the stones in a wall are surrounded by mortar" (pp 38, 40)

As to the effusion of serum, TRAVERS observes —"The first change external to vessels in inflammation is not a permanent change, and looks like a measure of temporary relief to the over-loaded vessels which surround the inflamed centre It is an aqueous exudation from the colourless capillaries into the adjoining cellular texture It would seem to be a passive mechanical effect, as it doubtless often is, but for the precedence of other unequivocal signs of inflammation" (p 65)

WHARTON JONES says —"Immediately after or during the stagnation of the blood, exudation commences From being at first serous the exuded fluid comes at last to be pure plasma, at least a fluid containing a greater or less quantity of fibrin" He attributes the exudation "to the thinning of the walls of the vessels, from their relaxation and dilatation on the one hand and the pressure from within the vessels

on the other," and he also suggests, as likely to promote exudation, "that the plasma will be pressed out from among the aggregating corpuscles, even when the blood would not, if out of the body, present the buffy coat, and that because within the body the fibrin of the plasma does not so readily coagulate," but, when the blood is so changed that on abstraction the buffy coat appears, "the plasma at the same time that it is more quickly and energetically squeezed out from among the aggregating red corpuscles, will present itself in greater quantity and richer in fibrin, for transudation through the walls of the capillaries." He considers, with WATSON, that the cause of serum alone passing out first, "is, as in common oedema, owing to obstruction, the obstruction in inflammation being from the stagnation of the blood," but how obstruction determines exudation of serum alone, remains a question to help to a solution of this, it may be stated that, according to KURSCHNER, water passes most quickly through animal membranes and saline solutions more quickly than viscid, gummy, and albuminous solutions. With exudation," he says, "is completed the inflammatory process properly so called" (pp 584, 5.)

"The extravasation of the serum along with the coagulating lymph," says JOHN HUNTER, "is, probably not a separation of itself, as in a dropsey, but, a part of it being separated from the lymph in the coagulation of that fluid, is squeezed into the surrounding cellular membrane, where there is but little extravasation, and where the cells are not united by it. Thus, the circumference of such swellings is a little oedematous, but the whole of the serum if there be a depending part will move thither, and distend it considerably, as in the foot in consequence of an inflammation in the leg. But, in most cases, there is a continued extravasation of serum long after the extravasation of the coagulating lymph is at an end, so that depending parts will continue oedematous, while the inflammation is resolving, or while suppuration, or even healing, is going on. The whole swelling looks like a part of the body only a little changed, without any appearance of containing extraneous matter, and indeed it is simply formed by an extravasation of fluids without their having undergone any visible or material change, except coagulation" (p 285.)

GERBER speaks of the exudations after inflammation as *watery* or *serous* exudation when merely the serum of the blood is poured out, *plastic*, when the *liquor sanguinis* containing fibrin exudes without the blood-corpuscles, and *sanguineous*, when it is blood-coloured, the colour depending either on solution of the colouring matter of the blood, or the effused *liquor sanguinis* contains all the components of the blood, and even the blood-globules, thus forming the transition to haemorrhage (p 42.) He says, also, that in the fluid of *serous exudations* albuminous granules of albuminous fluids are usually found, that after *plastic exudations* a yellowish turbid fluid is found in the affected cavity, with fine pale yellow floeculi floating in it, or precipitated upon and perhaps adhering to the walls of the exuding surface. If the exudation of plastic matter go on longer, and the quantity of effused *liquor sanguinis* be considerable, the cavities may be filled with it, their walls and the organs they include may be covered with thick layers of fibrin, which at first is of a pale yellow hue and somewhat transparent with the consistency of imperfectly coagulated albumen. If death then occur, this hyaline substance quickly becomes granular, and, in consequence of chemical decomposition, is dissolved in the serum, but, if life continue, the characters of the exudation are otherwise altered (p 42,) which alteration he proceeds to describe as follows—"The separated serum is gradually absorbed whilst the fibrin floating in it is dissolved. The fibrin which is attached, on the other hand, becomes of a chrome-yellow colour, and, if examined under the microscope, is found to consist of a connected exudation of corpuscles, which are found in form twenty-four to thirty hours after the exudation, when the mass is of an orange yellow, and has acquired such consistency as to be stripped off the membrane in slips * * *. The exudation-corpuscles are in every respect the same as the lymph-corpuscles, they generally form many superimposed layers, being laid flat one over another, and so constituting membranes which completely resemble the tessellated epithelium when the connecting medium has disappeared, so that the edges of the primarily round corpuscles thrust against each other, and are thus rendered polygonal." Subsequently the cohesion increases, and a more fibrous structure is indicated, and "under the microscope an ever-increasing linear arrangement of the exudation-corpuscles, which are more intimately united at two opposite points in one line, by means of the connecting cyto-blastema than any where else, is apparent. The original globular exoto-blasts now assume a spindle-like form, and the flat ones continue

more flattened as their margins have become more spindle-shaped, and in their linear connexion form varicose fibres, at the enlargements of which the nucleus of the exudation-corpuscule continues visible, and either subdivides into several granules, or a new nucleolus is formed within it Between these now formed cellular fibres there still remains an inter-cellular hyaline substance, so that the masses may be separated mechanically in any direction" (p 434)

VALENTIN(a) describes the exudation-corpuscles as "like so many embryonic nuclei—round, granular, and lying tessellated one upon another, whilst their very small interstices contain a transparent gelatin" (p 215)

GULLIVER(b) differs from GERBER as to the similarity between the exudation and lymph-corpuscles "In mammiferous animals," he says, "it has always appeared to me that the lymph-globules differ in size, structure, and chemical characters from exudation-globules The latter are larger, more irregular in size and shape, more spongy or loose in texture than the former," generally exhibit two or three nuclei when treated with acetic acid, whilst the lymph-globules are only rendered slightly smaller by it The acid either dissolves or makes remarkably fainter the comparatively thick shell of the exudation-corpuscule, while the lymph-globule becomes more distinct when subjected to the action of the acid" * * * "The lymph-globules, in fine, in progress of development, may soon become more or less coated with fibrin, but, if examined at an early period, they will be found to resemble in chemical characters, the nuclei (nucleoli of VALENTIN) of primary cells" (p 83)]

9 Suppuration (*Suppuratio*, Lat , *Eiterung*, Germ , *Suppuration*, Fr) is, when resolution does not ensue, the suitable termination of simple inflammation, and, if that be severe, it appears the natural result, therefore, a *fully developed simple inflammation* is termed, by some, *suppurative inflammation* The pus is secreted through the walls of the capillary vessels, not, however, immediately as such, but is first formed by the changes which the inflammatory exudation undergoes, the coagulated fibrin is gradually converted into pus-globules, which then mix with the serum Pus is formed of all the components of the blood, the colouring matter excepted, and especially from its albumen and fibrin If it collect in the cellular tissue, *Abscess* (*Eitergeschwulste*, Germ , *Abcès*, Fr) is produced The process of suppuration is a true secretion, and the vital condition of the organs influences it as well as all other secretions There is usually no destruction of tissues connected with suppuration That we often find the remnants of destroyed cellular tissue in pus, or that the skin covering the abscess is destroyed, depends on accidental circumstances—in the great distention of the cellular tissue and skin, or in the suppuration, from general or local mischief, passing into *Ulceration* (*Verschwartung*, Germ , *Ulcération*, Fr) These remnants of destroyed cellular tissue must not be confounded with the *cores* (*Eiterpropflopfen*, Germ) so called *sloughs*, which are found in the midst of the inflamed cellular tissue at the commencement of suppuration, in the form of white jelly-like semi-transparent stringy flocks, which have no trace of organization, are at first firmly connected with the surrounding cellular tissue, but subsequently are thrown out with the pus These cores are tough concretions of coagulated albumen

The various opinions relating to the formation of pus may be arranged in two classes —1 It was supposed that pus was formed and secreted within the vessels of inflamed organs by the peculiar activity of the former 2 That pus was produced externally to the vessels of the inflamed organs, either in the solid parts in a state of inflammation, or in the effused fluids undergoing a change similar to that of fermentation or putrefaction According to the former opinion suppuration must be consi-

(a) See his "Principal Features in the Development of the Animal Tissues," in WAGNER'S Elements of Physiology, translated by R WILLIS, M D

(b) His notes in the Translation of GERBER

dered as a vital, according to the latter as a chemical process. The formation of pus as a secretive process first published by SIMPSON (*a*), more fully discussed by DE HAEN (1756,) and by MORGAN (*b*), was specially and more accurately proved by HUNTER, by BRUGMANS (*c*), and by PINEL. Upon the other supposition BOERHAAVE ascribed the formation of pus to the dissolving of the hard parts and the changes which take place in the effused blood, BELL and others to the putrefaction of the serum, GOTTER and QUESNAY, to the change in the coagulable lymph, HOFFMAN and GRASHUIS, to the decay of the fat, and STEWART to putrefaction of the chyle.

The process of the pus formation and the nature of pus, besides the above-mentioned writers, most meritoriously occupied PEARSON (*d*), HEWSON (*e*), E HOME (*f*), BERZELIUS (*g*), GRIITHUISEN (*h*), and have been recently examined with the greatest care, FISCHER (*i*), has furnished observations on its chemical composition, DONNE (*l*), GLUGE (*l*), and VALENTIN (*m*), have enriched our knowledge of its microscopic elements, GUTTERBOCK (*n*), WOOD (*o*), BONNET (*p*), and MANDT (*q*) have, in a chemical and microscopical view, furnished correct observations, which VOGEL (*r*) for the most part arranged and increased with the results of his own observation. Compare also VOGEL (*s*) and E V BIBRA (*t*).

10 The transition of inflammation into suppuration is probable—when the inflammation is active and quickly reaches an acute stage; when the pain is severe, the distention and swelling are considerable, the inflamed part of a lax character, and surrounded with much cellular tissue (*1*). If the inflammation continue longer than usual, without showing critical movements, if the pain becomes throbbing, the redness and swelling diminish without entirely disappearing, the swelling becomes softer, and the patient has a shiver, then the formation of pus has commenced, the swelling becomes still softer, is elevated in the middle, and sunk at its circumference, and on touching it *fluctuation* (*Schwappung*, Germ.) is felt. In order to be assured of this, the fingers may be pressed alternately upon the swelling, or, what is preferable, the finger or the flat hand may be laid on the side of the swelling, while this is gently tapped with the fingers upon the other, by which the undulations of the pus are communicated to the hand. The skin becomes transparent at the most elevated part, and the pus is seen through it, finally, the skin breaks by the process of continued absorption, and the pus is discharged. If the parts covering the abscess are unyielding, an extension of the

(*a*) *Disput de re Medicā*, 1722

(*b*) *Tentamen Medicum de Puris confectis* Edinb 1756

(*c*) *Diss de Puogenia* Groenig 1785

(*d*) *Observations and Experiments on Pus*, in *Phil Trans* 1810, p 294

(*e*) *In his Experimental Inquiries, Part the Second*, containing a description of the Lymphatic System, &c, p 117 London, 1774 8vo

(*f*) *A Dissertation on the Properties of Pus* London, 1788 4to

(*g*) Article "Pus," in *his Traité de Chimie*, traduit par M ESSLINGER sur des Manuscrits inédits de l'Auteur et sur la dernière édition Allemande, vol vii p 635 Paris, 1833 8vo

(*h*) *Naturhistorische Untersuchungen über den Unterschied zwischen Eiter und Schleim* Munchen, 1809

(*i*) *De Puris indole ejusque a pituita discernandi Methodis* Dorpat 1836

(*k*) *Archives générales de Médecine* 1837, Août

(*l*) *CASPER's Wochenschrift*, 1843

(*m*) *Repertorium für Anatomie und Physiologie*, 1837 Part ii p 197

(*n*) *De Pure et Granulatione Berol*, 1837

(*o*) *De Puris naturâ et formatione Berol*, 1837

(*p*) *Mémoire sur la composition et l'absorption du Pus*, in *Gazette Médicale de Paris*, 1837 No 38

(*q*) *Ueber den Eiter, den Schleim, und die verschiedenen Ergüsse*, in *SCHMIDT's Jahrbücher*, 1838, No 19, p 274

(*r*) *Physiologisch pathologische Untersuchungen über Eiter, Eiterung, und die damit verwandten Vorgänge Erlangen*, 1808

(*s*) *In WAGNER's Handwörterbuch der Physiologie*, etc

(*t*) *Chemische Untersuchungen über verschiedene Eitertarten und einige andere krankhafte Substanzen* Berlin, 1842

suppuration takes place in various directions before it makes its way out. (2) If the inflammation be slight, it often continues a long time without exhibiting any disposition to break It is often very difficult to distinguish the transition to suppuration in inflammation of deeply situated or in internal organs The usual appearances are—the symptoms of inflammation subside without crisis, the part does not return to its natural functions , it feels to the patient heavy, oppressive, or cold , he has frequent shiverings , the appearances of hectic fever set in, burning heat of the hands and soles of the feet, especially after eating, circumscribed redness of the cheeks, emaciation, night-sweats, purgings, and so on Deep-seated fluctuation is felt, or the surface of the part exhibits an œdematosus swelling The symptoms of hectic fever accompany every considerable suppuration, and it is probable that this must be ascribed partly to the loss of the albumen and fibrin of the blood, and partly to the absorption of pus

The circumscription of the pus in the cavity of the abscess depends upon the effusion and coagulation of the plastic lymph, which occur during inflammation, whereby a cavity with smooth walls is produced, in which the capillary vessels are very strongly developed, so that the pus is shut off from the other cellular tissue, and its spreading from cell to cell is prevented In cases in which the inflammation is not connected with plastic exudation this circumscription of the abscess does not take place , for instance, in many erysipelatous inflammations If suppuration occur on the surface of serous membranes, there must always be first produced a considerable development of vessels In structures which are very highly vascular, suppuration occurs more rapidly The walls of the abscess must be considered as *secreting* and *absorbing* surfaces In the resorption of pus, (by the veins and lymphatic vessels,) it is mixed with the blood and separated from it by the colatories of the body, specially the lungs and kidneys, or is deposited in the tissue of parts (metastatic abscesses,) it is, however, undetermined whether the pus is deposited as such or is produced by the after-changes which commonly occur in the inflammatory exudation (VOGEL) As the pus-corpuscles are larger than those of the blood, they cannot pass through the capillary vessels, and therefore only the serum of the pus is absorbed, or the pus-corpuscles are broken down, and can then also be absorbed We must not confound with this the entry of pus into a torn vein, or its formation by phlebitis in the vein and its further passage onwards with the blood In regard to the operation of absorbed pus, BONNET supposes that the absorption of good, cream-like pus, which has not been changed by the action of the air, will not produce any peculiar symptoms, because with it nothing enters into the blood but what is natural to it, but, if in depraved putrid pus hydrosulphate of ammonia be developed with a residue of ammonia, and be absorbed with the serum or pus, a septic poison is introduced into the blood, the presence of which has been ascertained by BONNET in the blood, and its separation in the urine

[(1) "The true inflammatory disposition and action," says HUNTER, "almost immediately ceases upon the commencement of suppuration, and, although the vessels may be nearly in the same state, yet they are in a much more quiescent state than before, and have acquired a new mode of action" * * * And he asserts, "as an invariable fact, that no suppuration takes place which is not preceded by inflammation; that is, no pus is formed but in consequence of it" * * * "The immediate state of parts which may be called the immediate cause of suppuration, I conceive to be such as cannot carry on its usual functions of life, and which state of parts I have called the state of imperfection, let the cause of that state be what it will , we have shown that irritation simply is not always sufficient, it often only brings on the adhesive stage, which is in most cases intended to prevent the suppurative" (p 372) "In spontaneous suppurations, one, two, three, or more parts of the inflammation lose the power of resolution, and assume exactly the same disposition with those of an exposed surface, or a surface in contact with an extraneous body If it is in the cellular membrane that this disposition takes place, or in the investing membranes of circumscribed cavities, their vessels now begin to alter their

disposition and mode of action, and continue changing till they gradually form themselves to that state which fits them to form pus, so that the effect or discharge is gradually changing from coagulating lymph to pus hence we commonly find in abscesses both coagulating lymph and pus, and the earlier they are opened, the greater is the proportion of the former" (p 378)

"Should the exudation become purulent, this gelatin (viz that which is interstitial to the corpuscles) acquires fluidity," says VALENTIN, "and the pus globules then swim in the *liquor puris*, sink tessellated to the bottom, and surround themselves with cells, which subsequently undergo transformation in accordance with certain laws into exudation fibres or exudation membranes" (pp 215, 216)

"This (suppurative) inflammation has symptoms common to inflammation in general, but," says HUNTER, "it has these in a greater degree than the inflammation leading to it, and has also some symptoms peculiar to itself *** it gives as much as possible the idea of simple pain without having a relation to any other mode of sensation *** the pain is increased at the time of the dilating of the arteries, which gives the sensation called throbbing, *** perhaps one of the best characteristics of this species of inflammation [This observation, as already noticed, (p 23,) is incorrect—J F S] When the inflammation is moving from the adhesive state to the suppurative, the pain is considerably increased (and which would seem to be the extent of this operation in the part,) but when suppuration has taken place the pain in some degree subsides *** The redness that took place in the adhesive stage is now increased, and is of a pale scarlet this is the true arterial colour, and is to be accounted a constant symptom, as we find it in all internal inflammations, when at any time exposed, as well as in those that are external" The dilatation of the old vessels, and the formation of new ones, which had occurred in the first or adhesive state of the inflammation, "are here carried still farther in the surrounding parts, which do not suppurate, and constitute two other causes of this redness being increased by the vessels becoming more numerous, and the red part of the blood being pushed more forward into many vessels, where only the serum and coagulating lymph went before The part which was firm, hard, and swelled, in the first stage, now becomes still more swelled by the greater dilatation of the vessels and greater quantity of extravasated coagulating lymph thrown out in order to secure the adhesions The oedematous swelling surrounding the adhesive gradually spreads into the neighbouring parts *** There is a certain period in the inflammation, when the suppurative disposition takes place, which is discovered by new symptoms taking place in the constitution, viz shivering" (p 377-79)

"The vessels are but little changed from the adhesive state at the commencement of the suppurative disposition, so that they still retain much of the form they had acquired by the first state, the discharge being at the beginning little more than coagulating lymph, mixed with some serum This is scarcely different from the adhesive stage of the inflammation, but, as the inflammatory disposition subsides, the new disposition is every instant of time altering those vessels to their suppurative state, the discharge is also varying and changing from a species of extravasation to a new formed matter peculiar to suppuration, this matter is a remove farther from the nature of the blood, and becomes more and more of the nature of the pus, it becomes whiter and whiter, losing more and more of the yellow and green which it is apt to give the linen that is stained with it in its first stages, and in consistence more and more viscid or creamy" (p 415)

JOHN HUNTER describes that as "an abscess in this part," i.e when "collections of matter are found in parts where not formed, more especially in the deeper-scaled ones, the matter moving from the scat where it was formed to some more depending part, or having met with some obstruction in its course, it takes another direction," whilst "abscesses which are commonly formed where matter is found, especially the more superficial ones, may be justly called abscesses of this part (p 510) Suppuration takes place much more readily in internal canals than internal cavities, *** more readily upon the surface of canals than in either the cellular or investing membrane The same cause which would produce a suppuration in the first parts (the canals) would only produce the adhesive in the other (the cavities)" (p 377)

"The cavity (of the abscess)," observes TRAVERS, "is surrounded by an effusion, and lined by a pellicle of lymph (pyogenic membrane,) whence the pus is furnished" (p 125) "The aspect of the suppurating membrane varies to such an extent as scarcely to exhibit, in some circumstances and situations, the granular form e.g.,

upon the walls of abscesses, and upon the free surfaces of mucous and serous membranes, but the fibrinous bed and the capillary loop of new formation, and a corresponding alteration of the pus-secreting surface from its normal state will always be detected upon careful examination, being essential elements of the suppurative process" (p 111) "A section of an abscess, from circumference to centre, presents the condensation of the wall by the deposit occupying the cells of the cellular membrane, the secreting membrane, the semi-solid flakes of lymph, and the collection of pus forming its contents, the arrangement, appearance, and proportion of each varying according to the stage of the suppuration" (p 125)

(2) Of the circumstances upon which depends the determination of abscess to the surface, the following very interesting account is given by JOHN HUNTER — "An internal pressure, produced by an extraneous body, acts equally on every side of the surrounding parts, and, therefore, every part being pressed alike, ought from this cause alone to produce absorption of the surrounding parts equally on all sides, supposing the parts themselves similar in structure, or, which is the same, equally susceptible of being absorbed, but we find that one side only of the surrounding living parts is susceptible of this irritation therefore, one side only is absorbed, and this is always the side which is next to the external surface of the body * * * From this cause we find abscesses, &c, whose seat is in or near the centre of a part, readily determined to the surface on the one side, and not on the other, and, whenever the lead is once taken, it immediately goes on" (p 448) He also observes — "We find that the absorption of whole parts, more readily takes place, to allow an extraneous substance to pass out of the body than it will to allow one to pass in Thus we see that the slight pressure produced by matter on the inside of an abscess has a great effect, and the matter is brought much faster to the skin (although very deep) than it would by the same quantity of pressure applied from without, and, indeed, so slight a pressure from without would rather tend to have an opposite effect, namely, that of thickening The reason of this is evident one is, a readiness in the parts to be freed from a disease already existing, the other is a backwardness in the parts to admit a disease This principle, therefore, in the animal economy produces one of the most curious phenomena in the whole process of ulceration, viz the susceptibility which the parts lying between an extraneous body and the skin have to ulcerate, while all the other side of the abscess is not irritated to ulceration, and the necessity there is that it should be so must be very striking, for, if ulceration went on equally on all sides of an abscess, it must increase to an enormous size, and too great a quantity of our solids must necessarily be destroyed" (p 449)

But mere pressure is not, according to HUNTER's views, sufficient for bringing the contents of an abscess to the surface, "there is an operation," says he, "totally distinct, and this is a relaxing and elongating process, carried on between the abscess and the skin, and at those parts only where the matter appears to point It is possible that this relaxing, elongating, or weakening process may arise, in some degree, from the absorption of the interior parts, but there is certainly something more, for the skin that covers an abscess is always looser than a part that gives way from mere mechanical distention, excepting the increase of the abscess is very rapid" (p 460) TRAVERS, in commenting upon this point, observes — "Whether the tendency of matter to the nearest surface, external or internal, the outer or inner integument, as the case may be, is due to the more yielding structure of parts in the direction of the nearest surface or to the operation of a physical law, as the increased amount of pressure from the increased area of the summit over the base, I cannot determine" (p 188)]

11 Pure good pus (1) is an opaque, tolerably consistent, yellowish white fluid, with a peculiar smell when fresh, which it loses on cooling, and of a sweetish taste, specifically heavier than water, (spec grav 1,030,) (2,) not readily subject to putrefaction (3,) reacts in its fresh state as an alkali, but, after a time is neutral or acid, probably because during its decomposition it forms acetic acid, and under the microscope is seen to consist of *fluid parts* and *globules*, (4) which can be separated by straining (5,) but very frequently this separation occurs spontaneously if the pus be left alone

[(1) Pus "is formed from some change, decomposition, or separation of the blood which it undergoes in its passage out of the vessels, and for effecting which the vessels of the part have been formed, which produces a subsiding of the inflammation from which it took its disposition * * * In order to carry on the decompositions and combinations necessary for producing this effect, either a new or peculiar structure of vessels must be formed or a new disposition, and of course a new mode of action of the old must take place This new structure or disposition of vessels I shall call glandular, and the effect or pus a secretion" (pp 415, 416)

"The purpose which the formation of pus serves in the economy is," says TRAVERS, "in conjunction with another act of inflammation, to open a communication with a contiguous surface, either for the purpose of liberating matter incapable of organization, and therefore superfluous or hurtful, or as indispensable to reconstruction or the effacement of lesions by granulation (p 118) The continuance of inflammation, beyond the term required for union in simple solutions of continuity, in cases which are beyond reparation by the direct adhesive process, and in phlegmon or adhesive deposit unaccompanied by external lesion, entails an addition of the suppurative to the adhesive action (p 124)

(2) The principal peculiar qualities of pus are its colour and consistence, but it appears that the colour takes its rise from the largest portion of the whole mass being composed of very small round bodies, very much like those small round globules which, swimming in a fluid, make cream "I should suppose," says JOHN HUNTER, "those round globules to be white in themselves as cream would appear to be, although it is not necessary that the substance of matter which reflects a white, should be itself white * * * These globules swim in a fluid which we should at first suppose to be the serum of the blood, for it coagulates with heat like serum, and most probably is mixed with a small quantity of coagulating lymph, for pus in part coagulates, after having been discharged from the secreting vessels, as mucus is observed to do, but, although it is thus far similar to serum, yet it has properties the serum has not" The fluid part of the pus would not coagulate on the addition of the gastric juice, or of solutions of neutral salts, but only with sal ammoniac, (hydrochlorate of ammonia,) "which would not coagulate any other of our natural juices" The proportion of the white globules in the pus "depends on the health of the parts which formed it, for, when they are in a large proportion the matter is thicker and whiter, and is called good matter" * * * Pus is specifically heavier than water it is probably nearly of the same weight with blood or any other animal substance rendered fluid It has a sweetish and mawkish taste, probably from having sugar in it, which is very different from most other secretions It has a smell in some degree peculiar to itself" (p 428-9)

(3) With reference to the putrefaction of pus, HUNTER observes—"Pus, from several circumstances often attending it, would appear in general to have a greater tendency to putrefaction than the natural juices have, but I very much suspect that this is not really the case with pure pus, for, when it is first discharged from an abscess, it is in general perfectly sweet There are, however, some exceptions to this, but these depend on circumstances entirely foreign to the nature of pus itself," (p 434,) of which he instances the communication of the air with the interior of an abscess, the nearness of an abscess to the feculent contents of the colon, or rectum, when blood is contained in abscess resulting from external injury, or when part of the solids mortify from the same cause, and the like, "in all such circumstances we find the pus has a greater tendency to putrefy than the pure or true pus," which, "although easily rendered susceptible of change by extraneous additions, is in its own nature pretty uniform and immutable It appears so unchangeable that we find it retained in an abscess for weeks, without having undergone any change, but these qualities belong only to perfect pus" (p 435) Pus from sores, he remarks, is subject to the same changes under similar circumstances GULLIVER also states, that he has had healthy pus "in a window, to which the sun had access for six weeks, without becoming fetid, and, if carefully washed of all impurities, it will continue sweet for an almost indefinite time" (a)

(4) THOMSON says the globular structure of pus was first mentioned by SENAC (b) The following is, I presume, the passage to which he refers—"The globules of (a) Medical Gazette, N S, vol 11 p 312 action et de ses Maladies, vol 11 Sup Paris, 1839-40 1749 4to

(b) Traité de la Structure du Cœur, et son

pus are similar to those of the blood such as are seen in the matter of which gonorrhœa consists are larger, whilst those which form the pus of ulcers are smaller and more unequal in size but this figure does not give redness to these globules, they are white, and this whiteness is constant" (p 659)

JOHN HUNTER describes as "the peculiar character of pus, globules swimming in a fluid which is coagulable by a solution of sal ammoniac, (hydrochlorate of ammonia,) which no other animal secretion he knew of is" (p 421)

(5) This does not accord with GUETERBOCK's (a) observation, who says, that "Pus of every kind and from any part may be separated into two parts, into a liquor and a substance, not soluble in it, but only suspended, rendering the pus turbid, and tinging it yellow, which, however, I could not completely separate by straining, although the most different papers were used For the fluid always flowed turbid, and the paper through which I strained being obstructed, the pus, diluted with water, began in a short time to putrify But, if you allow it to remain for a longer time in one vessel, you will find a supernatant yellow fluid, the greatest part of which, as will be shown hereafter, consists of albumen" (p 8)]

12 The fluid (serum) of pus shows no trace of globules it exhibits all the signs of albumen dissolved in water, which is distinguished, like the serum of the blood from the white of fowls' egg in not being thrown down by æther This fluid also contains *fat, osmazome, acetic acid,* perhaps also *lactic acid, hydrochlorate of soda, of potash, of lime, of ammonia, (BONNET,) phosphate, sulphate, and probably also acetate and lactate of soda, phosphate of magnesia and lime, a trace of iron and silica*

HENLE (b) found free fat, recognisable by the microscopé, in form of fatty vesicles

Whether many substances which are found in pus, such as *pyine, gluten, &c*, are proper constituents of that fluid seems still doubtful, as also whether the iron is not to be ascribed to some admixture of blood

[GUETERBOCK has entered into the chemical analysis of pus at very considerable length, (pp 11, 19,) and he describes "a new substance of peculiar character," to which, "although found not only in pus, but also in mucus, without any intermixture of pus, and in tubercular matter, he gives the name *pyine*, (from πυνη, i e formed of pus,) because he first discovered it in pus" (pp 12, 13) In the translation of GERBER'S Elements of General Anatomy (pp 97, 100) will be found the analyses of VOGEL, J MARTIUS, GUETERBOCK, KOCK, GOEBEL, and DUMAS]

13 The globules of pus vary in quantity, sometimes a larger, sometimes a smaller number being present, the thicker and better the pus, the more numerous are the globules They are of two kinds, the larger have a diameter of 0,0004—0,0005 of a Paris inch, are of pretty uniform size, usually tolerably round, rarely of irregular form most of them have an irregular surface, so that they appear as if covered with still smaller globules, they are more transparent and less coloured than blood-globules Between these larger globules swim about a smaller quantity of little granules, rarely as large as blood-corpuscles If the larger pus-corpuscles are for some time in contact with water, they become more transparent towards the edge, darker in the middle, and the same in spirits of wine In acetic acid the envelope becomes transparent, finally dissolves, and leaves behind a nucleus consisting of one, two, or three corpuscles of 0,0001 of a Paris inch in diameter, many of which have a central indentation Sometimes also the envelope bursts, and the nucleus is set free by shaking or rubbing The envelope consists of albumen

(a) De Pure et Granulatione Commentatio (b) Symbol ad Anat vill Berol, 1837, p Physiologica Accedit Tabula ænea Berol, 24, note
1837 4to

According to MANDT (as above) the larger pus-globules, in respect to their size, form, appearance, and their relation to chemical agents, exhibit a perfect accordance with those globules which the coagulated fibrin presents, either in inflammatory buff, in false membranes, or in the fibrils, which fibrin forms when the blood is shaken about with albumen. MANDT applies to these globules the name *fibrin-globules*, because they owe their existence to the coagulated fibrin which is secreted from the blood and external to the vessels. The second kind of globules, the diameter of which varies from $\frac{1}{400}$ to $\frac{1}{500}$ of a millimetre, and which are mixed with the pus-globules, belong to the globules of albumen coagulated by the salts of the serum they are, therefore, more numerous as the serum is more rich in salts. They are frequently found among fat-globules of different diameters.

[GUETERBOCK appears to be the first who discovered the different size of the globules in pus, he says —“All writers who have hitherto examined pus, KALTENBRUNNER (*a*) alone excepted, (who mentions that he has seen corpuscles and granules swimming in the pus of frogs, although in pure human pus, carefully preserved from the air, he states that he has sometimes seen granules of equal size,) (p 16,) speak of the globules swimming in pus as of only one kind. I have, however, always seen globules of vastly different size in pus, of which only the largest have been noticed by writers, even by GRIITHUISEN and E H WEBER. Although these exist in the greatest number in pus, yet it is not to be doubted that smaller ones swim among them. The proportions of the globules and liquor vary in every kind of pus, so that the greater be the number of globules the thicker and better is the pus, and *vice versa*” (p 8.) The size and form of the globules and granules given by CHELIUS are those stated by GUETERBOCK, who, subsequently comparing the globules in pus with the corpuscles of other animal liquors, says —“They are most like the globules I have found in mucus, but more irregular, unequal, and of much less number, most of which are of the same size, and some even larger than the pus-globules, as I have frequently by repeated observations ascertained, notwithstanding E H WEBER contends they are only half as large. Like the pus-globule, they also contain a nucleus, consisting of granules. I have sometimes seen globules of the same form and nature swimming in the saliva, but at other times I have measured them twice and thrice as large. Mixed with water, they quickly swell and are decomposed. Finally, the pus-globules differ from the blood-corpuscles, not only in size, but also in chemical properties, since the envelope of the former is dissolved by both water and acetic acid, whilst that of the latter is dissolved only by the acetic acid (p 11.)

The following is the account which GUETERBOCK gives of the chemical nature of the pus-globules, which he obtained from a wound in a horse —“The globules having been most carefully washed, and had concentrated acetic acid poured over them, were strained. In straining the envelopes of the globules were dissolved. On adding a solution of the ferro-hydro-cyanite of potash, a sediment was produced the one part of it neutralized by the carbonate of potash was first rendered turbid and then precipitated, whence I conclude that the envelope is to be included among the number of those substances which, named by BERZELIUS albuminous, are precipitated by the ferro-hydro-cyanite of potash. But the granules forming the nuclei of the globules are not dissolved by acids. I cannot yet certainly state whether, like the corpuscles of the blood, they are dissolved by the liquor of caustic potash, though it seems to me very probable that they are, for the liquor of caustic potash (or even the concentrated carbonate of potash) being added, the pus-globules become more transparent, and are less perspicuous, some after a certain time vanish, rudiments of the envelopes and granules being here and there left” (p 10.)

The pus-globules described by MAYO (*b*) as “occasionally seen in the blood of healthy persons,” the only person in whose blood he had not found them being an aged woman of seventy-seven years, though he admits that “nevertheless they differ to a certain extent from the globules which are seen in pus from an ulcerated sore,” GILLIVER (*c*) denies being pus-globules at all, and says they are probably the large white globules of the blood spoken of by MAGENDIE and Dr DAVY.

The following is GERBER’s account of the formation of pus, and of the reproductive organization in suppurating wounds —“A continual oozing of *liquor sanguinis* takes

(*a*) *Observationes quedam microscopicae in partibus animalium pellucidis institutae de inflammatione*. Dissert inaug Berol, 1835

(*b*) *Medical Gazette*, 1839-40, p 128

(*c*) Ib p 201.

place on the surface of the wound, the coagulating fibrin forms exudation-corpuscles, which are partially disposed in layers on the wounded surface to form the exudation-membrane, and the layers nearest the living surface are converted into cells, which become farther and differently organized according to the nature of the tissues to be reproduced. The cytoplasm or exudation-corpuscles most distant from the wounded surface become pus-corpuscles, which, with serum, form true pus, which on the one side covers the seat of organization, separates the so-called granulating surface from external influence, and on the other forms that soft, mild peculiar medium in which reproduction proceeds from the wounded surfaces towards the middle of the wound, and by which foreign substances are washed out of the wound.

"Pus." The exudation-corpuscles lying beyond the living influence of the wounded surface, but exposed to external agency, cannot retain their life for any length of time, and, forsaken by the organizing principle, degenerate in their organic formation, and their organic chemical blending, whilst those in contact with the living surfaces of the body, proceed in their farther organization thus, by the death of the former, is given life to the latter (*mors vita origo*).

"Upon the free exudation-corpuscles first appear delicate radiating lines, which divide their periphery into six or eight (rarely more) segments; these lines become more decided, and the capsule appears as if torn, though without any solution of continuity. In some even the nucleus seems inclined to break into from two to four pieces. At the same time the originally reddish-yellow fluid fades, the divided segments of the capsule and the divisions of the nucleus, which were distinctly linear, become rounded into cohering granules, whilst the now perfectly formed pus is of a greenish colour. The true pus-corpuscles thus formed, are still here and there connected together, (the pus-membrane,) like the cells of tessellated epithelium, are specifically heavier than the serum, appear under the microscope somewhat larger than lymph-exudation and blood-corpuscles (from $\frac{1}{300}$ to $\frac{1}{100}$ of a Paris line in diameter,) are of a yellowish colour, and mingled with oil-drops and albuminous granules, with which last they are commonly be sprinkled, and which are by many considered as integral parts of the corpuscles, they overlooking the usual large granules which in their connexion with the pus-corpuscles are so attached that the latter at first appear as lenticular, or cake-like quilted cushions. Subsequently the granules separate still more, so that the corpuscles are resolved into their elements, old pus therefore consists for the most part of these more or less isolated granules. The younger the pus, the greater the quantity of fibrin (transition-cytoplasm) and the older it is, the more fat does it generally contain. Thus, in the degeneration of its organization, from its commencement to its perfection, is it remarkably opposed to chyle, in reference to its organic and chemical relations" (pp 47, 48).

"False Pus." Secreted and exuded fluids very frequently occur in man and beasts, which without closer—that is, microscopic—examination, may be taken for pus, because they look very like it, and chemically often do not differ much from it, and yet are produced in another way, and are of different nature. On the contrary, substances are deposited and thrown out which seem very different from pus, and yet are either true pus, or very nearly allied to it.

"It is the above-described fluid alone, the true or proper, the so-called laudable pus, which is a necessary condition of reproduction; therefore I call it *reproductive pus*, and, as the corpuscles usually consist of seven granules, they may also be called septengranular pus-corpuscles. Previous to their division, these corpuscles always belong to the nucleated corpuscles, they are degenerating cytoplasm. In this constant quality of the true pus-corpuscle is the most certain criterion for distinguishing pus from other more or less similar fluids, and that fluid which contains no such corpuscles, or with them any corpuscles or deposit which do not exist in the pus of healthy wounds, is either not pus, or not pure pus" (pp 53, 54).

The following are TRAVERS's views on the constitution of pus—"Pus, I believe," says he, "to obtain its characters of consistency, opacity, and colour after exudation, and to consist of the superfluous or waste lymph which has been separated during the adhesive stage from the mass of blood held in solution by the serum, being thus a chemical modification of the constituents of the *liquor sanguinis*, in short, the latter fluid deprived of its original character and property of spontaneous coagulation. Pus particles resemble those of lymph seen in the vessels under inflammation, except that they appear broken down and partly dissolved in their texture instead of compact and of less regular figure, and, if when suspended in a drop of fluid,

compared with the elastic blood-corpuscle, to which they bear no analogy whatever, utterly inert and devitalized We never see pus in the blood-vessels but in fatal phlebitis, and, if introduced into the circulation by injection, it is destructive to life Although, therefore, a clean-wiped granulating surface soon presents a covering of pus, it is exuded as a colourless fluid of a more dense and unctuous consistence than serum Its appearance is simultaneous with the disappearance of the lymph-particle from the veins, the suppurative action being determined, or, in other words, the separation of the proper lymph-particle put an end to by its sufficient deposit in granulation, and the inflammatory nisus still prevailing from the continuance of the irritation, for no imperfect state can be perpetuated, the superabundant lymph-particle, at no time coloured, along with the permanent fluid or serum of the blood, is strained off through the pencils, forming the terminal loops of the granulation Thus is obtained the twofold purpose of relief to the loaded capillary circulation, and a bland and homogeneous protecting fluid for the granulation during the period of its growth up to that of final organization When the rudimental fibrin is no longer needed for the new structure, it is used, as in nature all remnants are, for a new but not less important purpose,—the preservation of that structure Pus is as necessary to the maintenance of granulation as lymph was to its formation, but a change is necessary to fit it for its new function, and this is provided for by a new arrangement of a new action of the secreting capillaries, and a chemical change, which destroys its vital property and amalgamates the separated lymph-globules with the serum of the blood The precedence of adhesive to suppurative action is sufficient to render presumable a necessary connexion between the lymph separated during the first process, and afterwards disappearing, and to explain the invariableness of this relation in the order of their appearance There is no analogy between the effusions of serum or of *liquor sanguinis* incidental to primary wound or injury of any kind and pus, yet the ingredients of the two latter are the same it is by the combinations of a vital chemistry that their appearance and sensible properties differ, and this we are capable of imitating If this theory be admitted, it will explain the appearance of pus in the absence of the especial granular structure or distinct pyogenic membrane, as seen upon mucous, serous, and synovial surfaces and canals, and, even in the absence of fibrinous evadation, as in certain modes of inflammation, where the habit of the parts or the character of the inflammation renders them incapable of carrying on the adhesive action, or that action is by violence interrupted Puriform mucus, muco-purulent secretion, are terms in common use, indicating the transition stage witnessed in these cases, so also the modifications of colour, consistence, and purity are explained, which are conveyed by the terms sanious, flaky, or whey-like, ichorous, &c , and the improvement of the secretion by elaboration from that of fistulae and sinuses to the ‘pus laudabile’ of old authors concurrent with the improved vitality of the granulations, meaning a fuller proportion of the lymph-particle to the serum, and *vice versa*, its degeneration in enfeebled and sinking states of the system Thus also is explained the effect of inordinate and excessive suppuration to superinduce hectic, from the excessive withdrawal of that ingredient which forms the nutrient and restoring principle of the blood * * * The conversion of the blood-corpuscle into the pus-corpuscle is a notion altogether gratuitous and unsupported either by appearance or probability, and, to my mind, the above is a theory more reconcilable with all the circumstances attending its origin than that which supposes *de novo* formation of the pus globules But the wounds of cold-blooded animals not being subjected to the true suppurative process, nor those of mammalia and birds disposed to free suppuration, there appears to be insuperable difficulty in establishing this theory by actual demonstration” (pp 172, 6)]

14 The nature of the pus varies considerably according to the nature of the parts in which it is formed, according to the constitution of the person, according to the degree and character of the inflammation, it may be changed by other fluids, mingled with it We distinguish good cream-like, uniformly consistent, yellowish white, inodorous pus, (*pus bonum et laudabile*, Lat ,) thin, mucous-like, serous, grayish, greenish, brownish, and more or less fetid pus (*sames, ichor, Lat , Jauche, Germ*) (1) These varieties of pus, as well as the fluid products of inflammation especially, depend merely on the different proportions of the materials

composing it All these products are derived from the blood, and in them are found all the same materials as in the blood, excepting fibrin. Thus is it clear why chemical and microscopical examination cannot ascertain any determinate difference between the products of inflammation and the serum of the blood, the mucus, the serum from dropsy, the yellowish white fluid (*materia puriformis*) poured out from inflamed mucous membranes (2), the thin, lymph-like fluid which exudes from inflamed serous membranes (3) and the various kinds of pus appear to be compounded in the same way Their difference consists only in the different proportions of the several substances, in their disposition to organization, and in the greater or less advanced degree of plastic activity (4)

The presence of globules in the serum has been long since proved by BAUER and FARADAY (a), as also by MANDT and others in the various effusions and serosities which occur in the cellular tissue and in the serum of dropsy, but the albumen in pus is in a higher degree of coagulation, is opaque, of tolerable consistence, and coagulates less by warmth, and by the concentrated acids The difference between creamy, consistent, and thin serous pus depends entirely on the different proportions of the fluid and of the pus-globules BONNET, (as above,) who seems not to know the pus-globules, derives this difference from the greater proportion of the emulsive fat in the former and its smaller proportion in the latter We may give every kind of pus that semi-transparency, that stringy character, that adherence of its parts which seem especially proper to mucus, if we mix and shake it up with a solution of hydrochlorate of ammonia, whereby the proportion of one of its components is increased The consistence of pus is to a certain extent influenced by the length of time it has been retained in the body, the absorption of its fluid part thereby occurring, and in suppurating surfaces perhaps also by the influence of the air, as, in the latter case, when the pus is washed off clean, a clear serous fluid is always observed to ooze up In this manner we may judge of the various tests of pus, for the purpose of distinguishing it from mucus According to GRASSMEYER (b), if pus be mixed with twelve parts of distilled water and one part of *liquor potassæ*, a viscous transparent jelly capable of being drawn into thread is formed, more quickly or more slowly according to its different composition According to GRIETHUISEN's microscopic examinations (c), pus exhibits white spherical granules slightly dotted upon the surface, which after some hours fall, and even preserve their round form in pus which has been dried and again moistened In mucus these granules only appear when it is previously thinned with pure fluid the granules in mucus are less numerous and dark-coloured FISCHER (as above) holds it best, in order to determine the presence of pus and mucus, to mix and shake together the questionable matter with two or three parts of *liquor potassæ* or *liquor ammoniæ caustici*, and then to add hydrochlorate or nitric acid to neutralization If it contain pus, there will be produced by the continued addition of the acid a whitish flocculent sediment

* [(1) "Ichor," says GERBER, "has very various colours, and is generally more fluid than pus The ulcer is a wound with a dead surface incapable of throwing out or organizing plastic lymph, bedewed with a depraved serum (*ichor*) destructive of every exudation This ichor acts injuriously on the ulcer, destroying it and eating into the neighbouring vessels hence the discharge of small quantities of blood, which is immediately discoloured in the ichor, and so much changed that the *liquor sanguinis* rarely coagulates, save in granules, the blood-corpuscles appear puffed up, corroded superficially, divided into irregular pieces or even shrivelled up The blood-corpuscles thus altered are denominated *ichor-corpuscle*. they are commonly covered with granules attached to them or partially lying on them, their character is ascertained in the discharge of glanders which principally consists of them" (p 56)

(a) See HOME on the Conversion of Pus into Granulations or New Flesh, in Phil Trans 1819, p 2

(b) Abhandlung von dem Eiter und den

Mitteln, ihn von allen, ihn ähnlichen Flüssigkeiten zu unterscheiden Götting, 1790

(c) Naturhistorische Untersuchungen über den Unterschied Zwischen Eiter und Schleim München, 1809

(2) "Puriform mucus, secreted in the last stage of catarrhal affections, varies according to the extent of reproduction which the affected mucous membranes require. Should the mucous glands and follicles be altered in a less degree than the cuticle, which after catarrhs is always produced afresh, then the mucus, besides the usual mucous corpuscles and granules, contains, instead of the usual older elements of the epithelium, which are large, squamous, granulated, epithelial cells or cylinders, a large addition of newly-formed small lenticular cells, in which the nuclei are often recognised with difficulty, hence rendering them very like large exudation-corpuscles. Sometimes among these young epithelial cells true pus-corpuscles are observed, when any part of the mucous membrane needs reproduction" (p. 54.)

(3) "In serous exudations," he proceeds, "it is usual to find albuminous granules in albuminous fluids, and, if a great part of the serum be again removed by absorption, the crystals of different salts * * * After plastic exudations, a yellowish turbid fluid is found in the affected cavities containing fine flocculi of a pale yellow colour. These are partially precipitated upon the walls of the cavity, which appear bestrewed over the whole extent of the exudation" (p. 42.)

The distinguishing characters of true Pus and Ichor have been already mentioned.

(4) This statement of our author, "that chemical and microscopical examination cannot ascertain any determinate difference between the products of inflammation and the serum of the blood," &c &c, and that "their difference consists only in the different proportions of the several substances," &c &c, is rather too hasty, as the extracts just quoted from GERBER on the subject show that there is a well-marked distinction among them — J F S]

15 Pus cannot be produced without inflammation, but the latter may exist in so slight a degree as to be scarcely, or even not at all, observable, and, on account of the too slight vital activity of the organ, the low state of the nervous power, and of the plasticity of the blood and the diseased diathesis, a serous thin pus is produced without the appearances of inflammation being manifest. The circumscription also of the pus in a definite cavity proves that inflammation must have been present. Abscesses thus originating are called *Cold Abscesses, Lymph Abscesses (kalte Absesse, Lymph Absesse, Lymphgeschwulste, Germ., Abcès froid, Fr.)*. They are always the consequence of a general cacochemic or dyscracic affection, and arise either spontaneously and commonly in many places at once, or are produced by an external injury.

We may very properly apply with WALTHER the name *Diathesis purulenta* to that general condition of the body which is the ground of these abscesses, but it is improbable that pus can be formed in the blood itself by decomposition within the vessels, and that the blood can be immediately converted into pus. The circumstance of pus having been found in the blood, cannot form a ground for this opinion, as this, if the walls of the veins are not inflamed, intimates merely the absorption of the pus which has been found as well in the lymphatic vessels as in the veins (a). The so-called *abscess of congestion*, in which the source of the pus, mostly the carious destruction of bone, is more or less distant from the collection of pus upon the surface of the body, must be distinguished from cold abscess this, however, will be considered in several places.

16 The commencement of cold abscess usually sets in, without any sensibly perceptible local appearance, with diminution of appetite, general uneasiness, slight fatigue, disturbed sleep, and so on. Next, there appears on some part of the surface of the body, (where many patients fancy they have had a sort of prickly sensation,) most commonly between the shoulder-blades, on the chest, on the loins, on the upper part of the thighs, a little, not discoloured, elastic, scarcely fluctuating swelling, which is not painful, and at the utmost gives the patient an obscure sensation of tension and weight. Gradually the swelling

(a) See CRUVELIER, Anatomie Pathologique, vol 1 p 200 GENDRIN, as above, p 22.

enlarges, often to a considerable size, the fluctuation is distinct, and the symptoms of a disturbed assimilation become more marked After a shorter or longer time, the swelling begins to be painful, the skin covering it reddens, becomes tense, the general appearances mentioned are more decided, febrile action sets in, and the whole countenance of the patient is cachectic The skin, continuing to thin, at last breaks, and a quantity of thin, pus-like, often completely putrid and stinking, fluid is evacuated, followed by a clear discharge, which, if the neighbouring bone be destroyed, is of an ichorous character By this great loss of the juices, and by the colliquative sweats and purging, which soon set in, the powers of the patient are speedily broken up

[The cold abscess here described must be confounded neither with HUNTER's "collections of matter without inflammation," (p 390,) which are, as he says, of a scrofulous nature, and very different from that under consideration, nor with "the cold abscess of the surgeons of the Saracen school, the chronic abscess of modern surgeons," mentioned by BOYER and CRAIGIE(*a*) (pp 43—163), and caused by *chronic inflammation*

The true cold abscess, which CHELIUS has here well described, is, I believe, very rare I have recently had a case of which the following is a brief account —

Philip Coyne, aged 26, admitted under my care,

August 27th, 1844 He was very irritable, complained of much lassitude and debility, and that he had some difficulty in passing his water, for which about a fortnight ago he had a catheter passed, but had not been since inconvenienced He did not, upon examination, appear to have any surgical complaint, but, as he had been ill-fed, and suffering privation for some little time before his admission, I kept him in the house for charity's sake, though I suspected he was feigning illness He, however, grew worse, had a hot skin, with much perspiration, loss of appetite, pains in his joints, and, again complaining of difficulty in passing his water, which was not, however, caused by any stricture, I considered therefore his case to be medical, and, on

September 3d He was transferred to Dr Burton's care, who treated him with sulphate of quinine and citrate of iron, with a colocynth and calomel pill occasionally He continued growing worse, and, on

September 10th I was requested to see him again, when he still complained of difficulty in voiding his urine, and had a largely diffused swelling extending over the whole right inguinal region, without redness, with little pain, but with distinct fluctuation, and extending down behind the right spermatic cord into the scrotum, which was so little protruded that the swelling there was only accidentally discovered The swelling in the groin, which was only noticed yesterday or the day before, is quite subcutaneous I made a puncture a little above the middle of Poupart's ligament, and drew off a pint of healthy sweet-smelling pus, and the swelling in the purse subsided as it flowed Half a grain of acetate of morphia nightly was ordered, to give him rest, which he much needed

On the following day he was better, and a mutton chop with porter daily was ordered

September 13th There is little discharge from the puncture, but he now points to another subcutaneous abscess without redness and with little pain beneath the spongy body of the penis, which was opened, and a table spoonful of good pus voided He complains of much tenderness in the left knee, to which bran poultice was ordered

September 14th But little discharge from either opening Since yesterday a large diffused swelling has presented on the left side of the chest, below the arm-pit, without redness, but tender and with indistinct fluctuation

September 16th The abscess just mentioned was opened, and four ounces of good pus discharged He now points to another diffused swelling, without redness, on the front of the right shoulder, which fluctuates indistinctly There is but little discharge from the groin For the last two days he has been taking ammoniated citrate of iron, five grains, with a drachm of compound spirit of ammonia in infusion

of quassia thrice a day. I ordered him, in addition, half a pint of port wine, as he sweats very profusely, has a quick, feeble pulse, and is very weak and thirsty

September 17th The abscess on the shoulder was punctured, and about an ounce of pus discharged. The sweating still continuing, he was ordered to take of dilute nitric acid ten drops in infusion of roses, thrice a day

On the following day, being nauseated and a little sick, a draught of peppermint water with a drachm of sulphuric æther was ordered, but it did not do him much good, and, on

September 19th He was ordered, instead, five minimis of dilute hydrocyanic acid in water, a mustard poultice to the region of the stomach, and four ounces of brandy daily, instead of the wine. The abscesses on the shoulder and chest discharge freely, but those below are healed

September 27th On the whole, somewhat better, but the discharge is still very profuse. There is now much fluid in the mucous bag behind the insertion of the *m. rectus femoris*, and the knee is very tender. The bran poultice was discontinued, and a blister ordered, with a poultice afterwards

October 8th Has not materially improved, and is now attacked with diarrhoea. Ordered fifteen minimis of nitro-muriatic acid three times a day

October 9th The diarrhoea continues, and is now accompanied with sickness. The acid to be left off, and in its stead fifteen grains of carbonate of potass, with compound tragacanth and acacian gum powder in clove water, with compound spirits of ammonia and tincture of cardamoms, every four hours

October 21st On the whole, better, but little discharge from the abscesses, the knee unimproved

October 28th Another blister applied to the knee

November 2d The knee considerably swollen and painful, an issue to be put in above and below the joint

Having got into a very awkward and uneasy posture, his left leg being laid completely on the outside, and not moveable without great pain, I thought it advisable to get the limb on an amesburg, and gradually from day to day to raise it up till on the heel. This was effected in the course of a few days, and rendered him much more comfortable, and the knee diminished in size, as the issues began to discharge. He never, however, rallied, but gradually continued drooping, became very excitable and so weak that he continually passed his motions beneath him. A patient's death near him had very much troubled him during his illness, and, another having died on 22d December, he again became alarmed, and sunk on the following morning without any other especial cause

The examination of the body on the third day after death presented the following remarkable and unexpected appearances, as he had never made any complaint, nor had the attendants more than myself noticed any circumstance which could lead to the expectation of the results which occurred

The body generally was thin, but not much emaciated. The slough on the rump had exposed a large portion of sacrum. Between the crest of the right ilium and the great trochanter, the soft parts were prominent and fluctuating

The heart and lungs were perfectly healthy

All the abdominal viscera were healthy except the liver, which was much enlarged, and extremely pallid, and had degenerated into fat to an extreme degree

The right *m. iliacus* was raised from the concavity of the ilium, prominent, tense, fluctuating when touched, and the fluctuation communicated to the external prominence between the iliac crest and trochanter. When the muscle was cut into, a large quantity of dirty stinking pus was found filling the iliac pit internally, and communicating through the ischiatic notch, of which the edge had become carious and rough, with a quantity of similar pus extravasated among the gluteal and all the muscles in the neighbourhood of the back of the hip-joint. All the muscles were separated from each other and had assumed a greenish appearance. In front of the joint there was only a small collection of pus, and the muscles were seemingly healthy. The hip-joint contained a small quantity of dirty purulent fluid, there were slight traces generally of synovial inflammation, specially at the notch, and where the acetabulum was devoid of cartilage. The right ilium was rough and carious on both external and internal surface, and the right sacro-iliac symphysis so extensively destroyed that slight force separated the bones, the surfaces of which were carious

The left knee-joint nearly all the articular surfaces deprived of their cartilage, small isolated patches alone remaining, and the exposed surface of the bone being everywhere rough and carious The crucial ligaments were only partially destroyed.

Neither of the vertebral bodies were affected with disease — J F S

My friend Dr RIGBY (*a*), in his account of contagious or adynamic puerperal fever, speaks of a peculiar kind of abscess following attacks of that disease, which we saw together in several instances at the General Lying-in Hospital "Where," says he; "the constitution has borne the brunt of the attack without immediate collapse, and the local mischief been controlled by appropriate means, we find that fresh efforts are made to rid the circulation of the morbid matter with which it is infected The patient is suddenly seized with severe pain, with heat, redness, and swelling of one of the large joints, presenting all the appearance of arthritic or rheumatic inflammation, and also of certain muscles especially, the supinatores of the arm, the glutei and gastroenemic The painful spot soon becomes hard, it is intensely tender, and in two or three days the feeling of fluctuation indicates the formation of an abscess, from which a large quantity of greenish coloured pus mixed with blood and serum, is discharged The cellular tissue beneath the skin and between the muscles is equally affected, and, if examined when the abscess is just beginning to form, will be found of a dirty brown colour, softened, infiltrated, and here and there condensed with lymph or pus, precisely as in cases of gangrenous erysipelas the muscular tissue has entirely lost its red colour, and closely resembles the appearance of boiled meat, its structure so softened as to tear easily under the fingers, and interspersed with deposits of immature lymph and purulent fluid, the commencement of what would have been an abscess Like gangrenous erysipelas, the extent of the abscess does not seem to be limited by a surrounding wall of healthy lymph, as seen in a common phlegmon, but, if deep beneath the surface, it continues to spread in all directions, until nearly the whole limb appears to be implicated in one immense abscess hence, in those patients who have recovered under these attacks, the limb has frequently been rendered useless, the muscles being atrophied and coherent" (p 291) The following observation of the same writer in reference to the contagious nature of these abscesses is extremely important "That the discharges from a patient under puerperal fever are in the highest degree contagious, we have abundant evidence in the history of lying-in hospitals The puerperal abscesses are also contagious, and may be communicated to healthy lying-in women, by washing with the same sponge, this fact has been repeatedly proved at the Vienna hospital, but they are equally communicable to women *not pregnant* on more than one occasion the women engaged in washing the soiled bed linen of the General Lying-in Hospital, have been attacked with abscesses in the fingers or hands, attended with rapidly spreading inflammation of the cellular tissue" (p 292)

17 BEINL, RUST, and others, consider the nature of the so-called lymph-swelling to be an *extravasation of lymph*, depending on a rupture of the lymph-vessels, or on an unnatural extention of their walls, and they explain the gradual sinking of the powers of the constitution and so on, which occur at the latter period of the disease, and after its bursting, by the continued loss of the lymph (*b*) The observations made on the fluid contained in these swellings (which RUST imagined to be only in the earlier period of the disease, transparent and colourless) have shown that it has more of the properties of pus than of actual lymph, and WALThER has decidedly proved that the acceptance of the term lymph-swellings in the sense just mentioned is inadmissible, that they must be considered only as abscesses (*lymph-abscesses*) preceded by a stealthy, if not a sensibly perceptible, inflammatory condition, which, however, on account of the too much depressed vital activity, could not produce a plastic consistent pus, but only a secretion of a thin more or less turbid

(*a*) A System of Midwifery, Lond, 1844, forming part of TWEEDIE'S Library of Medicine

(*b*) J A SCHMIDT, über den Grund der Todlichkeit der Lymphgeschwülste, in Abhandlungen der Medic Chirurg Jos Akademie in Wien, vol 11

lymphatic fluid. The opinion advanced by BEINL that the strongest and most healthy subjects are commonly more subject to this disease than the weakly, that men more than females, and that, without an external injury, a general diseased condition is incapable of producing a lymph-abscess, is incorrect, and has been disproved by RUST. How frequently, even by writers on lymph-swellings, cold abscesses and such collections of pus as have formed at distant parts (*congestion-abscess*), (a) in consequence of carious destruction of the bones of the vertebral column, have been taken for lymph-swellings, and treated as such, I myself have frequently observed

NASSE (b) describes a case in which a powerful healthy young man, in consequence of an external injury, had a swelling formed on the upper part of the thigh, the contents of which, after opening, perfectly resembled lymph. The pouring out of a clean transparent fluid could not be allayed by any treatment recommended for lymph-swellings, and the patient was exposed to the danger of hectic consumption. The local use of a solution of nitrate of mercury alone brought the lymph-vessels to close. This case (which I myself saw, although only once, in passing through Halle, and convinced myself of the continued outflowing of clear lymph which could be increased by pressure) proves that a collection of lymph in the cellular tissue is possible, as the consequence of an actual tearing of lymph-vessels by external violence, the exudation from which ceases only by obliteration of the torn vessels. Cases of this kind are, however, undoubtedly very rare, to them alone can be applied the term *lymph-swelling* in its proper sense, and therefore the above advanced opinion, "that the cases commonly spoken of as lymph-swellings are merely modifications of abscesses," is rather confirmed than contradicted. This opinion LANGENBECK (c) has also advanced, although, he adds, that not unfrequently a swelling is observed on the elbow, which is formed sometimes from a local cause, and sometimes also without, is situated immediately on the olecranon, and contains a clear lymphatic fluid enclosed in a cyst, which deserves the name of lymph-swelling, I must yet deny this assertion, as this swelling at the elbow joint is a dropsey of the mucous bag there situate, and may be compared to the *Hygroma cysticum patellare*. Just as little also can I agree with the opinion of EKL (d), who considers the lymph-swelling as an expanded mucous bag in which there is a diseased secretion going on. ZEMBACH (e), according to KRUGE, in order to accommodate the different opinions of writers, distinguishes, 1st, the acute and chronic lymph-swelling, as idiopathic and symptomatic disease, 2d, the false lymph-swelling or lymphatic abscess.

[A case marked in my note-book, "Collection of synovial fluid within the femoral sheath," which occurred in St Thomas's Hospital in 1839, seems to be more nearly allied to the lymph-abscess of this paragraph, of which I was then ignorant than to a collection of synovia, as I thought it perhaps might be. The patient was a healthy country lad, seventeen years old, who three years previously had received a blow on the upper outer part of his left thigh, but seemed to have recovered from its effects. Two months since he noticed a swelling on the outside of the same thigh, about a hand's breadth above the knee-cap, which gradually increased both downwards and upwards, so that at his admission it occupied the outer and fore part of the thigh, from a little above the knee to near the great trochanter, fluctuated distinctly, and was presumed to be an abscess in the outer chamber of the femoral sheath. Fifteen minims of tincture of muriate of iron in mucilage thrice a day were ordered, to excite absorption, which was continued for nearly three weeks without benefit. The thigh then having increased, and fluctuation and swelling having extended about the whole knee, I made, by the direction of my then colleague TRAVERS, whose patient he was, an incision two inches long, about the middle of the outside of the thigh, expecting

(a) A PAULI, Bemerkungen über Conges-
tionsabsesse, in RUST's Magazin, vol viii
p 383, vol viii p 434

(b) Archiv für medicinische Erfahrung
von HORV, NASSE, und HEYKE, vol i 1817, p
377

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(c) As above, vol ii p 197

(d) Bericht über die Ergebnisse, in Chi-
rurg Klinikum zu Landshut. Landshut,
1824 4to

(e) Ueber den Lymphgeschwulst, in RUST's
Magazin, vol xxvii p 1

to evacuate pus or open the femoral sheath, but neither pus nor any other fluid escaped, although I cut into the *m. vastus externus* an inch deep. A tent of lint was left in the wound to keep it open, and hasten the escape of pus if any should make its way through the wound, but none appeared, and in the course of a fortnight the wound had entirely healed. The tincture of iron, which had been continued to this time, was now left off, and two grains of iodide of iron thrice a day, ordered in its stead. A week after the whole thigh was wrapped in mercurial ointment, and swathed in a roller. This treatment was continued for three weeks, but without any diminution in size, or apparent change, fluctuation was still very distinct, and the fingers of one hand being applied, whilst pressure was made with the other hand alternately above, a thrilling fluctuation was felt. It was therefore determined to introduce a grooved needle about the middle of the thigh, and some fluid very similar to synovia escaping by it, an abscess lancet was then, with my colleague's consent, thrust in, making an opening an inch long in the skin, and half its length in the sheath, from which escaped about twenty ounces of the seemingly synovial fluid, which nearly emptied the cavity, leaving a rather moveable lump about the middle of the fore part of the thigh, the character of which I could not make out. The edges of the wound were carefully brought together, the limb rolled, and in four days union had taken place. A week after another free puncture below the former voided a quart of the same fluid as before, and on applying heat it coagulated speedily and almost entirely. The wound was left open, and a roller applied above and below it, but in the course of a week it had again united, and fluid was again secreted, though in smaller quantity. A solid but moveable swelling had at this time also formed to some extent around the wounds. The iodide of iron was then omitted, and, instead, was ordered decoction of sarsaparilla four ounces, with five grains of iodide of potash twice a day, the whole thigh to be enclosed in ointment of iodide of potash. Three weeks after the solidification had increased, and the fluctuation generally was less distinct, and soon after the ointment was given up, and mercurial plaster applied. Two months after, having begun to take the iodide of potash, the thigh had much diminished, there was less fluctuation, the middle outer skin was almost solid, and there is less effusion about the knee. The diminution of size and fluctuation continued, and in about two months he was able to walk about. He continued with us about four months longer, and when he left the house, the swelling about his knee, although not completely subsided, had so considerably diminished as not to interfere with his walking.—J F S.]

18 Ulceration (*Exulceratio*, Lat., *Verschwartung*, Germ., *Ulcération*, Fr.) is distinguished from suppuration, in being connected with an actual destruction of parts, (by ulcerative absorption,) and with the secretion of a thin, acrid, fetid, and variously coloured pus-like fluid. It arises either immediately from inflammation, or from a preceding abscess. Its causes are either local injury,—for instance, improper treatment of the abscess which has been opened,—or general disease, as scrofula, syphilis, and so on.

[In considering the subject of ulceration, or "ulcerative inflammation," as he most properly calls it, HUNTER first indicates the economy of the absorbent vessels, and speaks of them in two views first, as they absorb matter, which is not any part of the machine, secondly, as they absorb the machine itself." The former of these functions is of two kinds, of which the one absorbs external matter, either applied to the skin or received into the alimentary canal, and the other takes up internal matter, as many of the secreted juices, the fat and the earth of bones, &c., both, however, serve principally to the nourishment of the body as well as to other and even hurtful purposes. The second function, that of "removing parts of the body itself, * * * may be viewed in two lights" The one view presents them as causing "a wasting of the whole machine or part, * * * which I call *interstitial* absorption, because it is removing parts of the body out of the interstices of that part which remains, leaving the part still as a perfect whole. But this mode is often carried farther than simply wasting of the part, it is often continued till not a vestige is left, such as the total decay of a testicle." The other view exhibits them as "removing whole parts of the body," and "may be divided into the natural and dis-

eased" Under natural circumstances the absorbents "are to be considered as the modellers of the original construction of the body," for "no alteration can take place in the original formation of many of the parts, either in the natural growth, or that formation arising from disease, in which the absorbents are not in action, and take not a considerable part this absorption, I shall call *modelling absorption*" * * * Absorption, in consequence of disease, is the power of removing complete parts of the body, and is in its operation somewhat similar to the first of this division or modelling process, but very different in the intention, and therefore in its ultimate effects This process of removing whole parts in consequence of disease, in some cases, produces effects which are not similar to one another, one of these is a sore or ulcer, and I therefore call it (the absorption) *ulcerative* In other cases no ulcer is produced, although whole parts are removed, and for this I have not been able to find a term, but both may be denominated *progressive absorption* * * * It may be difficult at first to conceive how a part of the body can be removed by itself, but it is just as difficult to conceive how a body can form itself, which we see daily taking place, * * * but this I may assert, that wherever any solid part of our bodies undergoes a diminution, or is broken in upon, in consequence of any disease, it is the absorbing system which does it When it becomes necessary that some whole living part should be removed, it is evident that nature, in order to effect this, must not only confer a new activity on the absorbents, but must throw the part to be absorbed into such a state as to yield to this operation This is the only animal power capable of producing such effects, and, like all other operations of the machine, arises from a stimulus or an irritation, all other methods of destruction being either mechanical or chemical The first by cutting instruments, as knives, saws, &c , the second by caustics, metallic salts, &c The process of ulceration is of the same general nature in all cases, but some of the causes and effects are very different from one another" (pp 440, 2) "This process of the removal of parts of the body, either by interstitial or progressive absorption, answers very material purposes in the machine, without which many local diseases could not be removed, and which, if allowed to remain, would destroy the person It may be called in such cases the natural surgeon It is by the progressive absorption that matter or pus, and extraneous bodies of all kinds, whether in consequence of or producing inflammation and suppuration, are brought to the external surface, it is by means of this that bones exfoliate, it is this operation which separates slough, it is the absorbents which are removing old bones, while the arteries are supplying new ones, and, although in these last cases of bones it arises from disease, yet it is somewhat similar to the modelling process of the system in the natural formation of bone, it is this operation that removes useless parts, as the alveolar processes when the teeth drop out, or when they are removed by art, as also the fangs of the shedding teeth, which allows them to drop off, and it is by these means ulcers are formed It becomes a substitute in many cases for mortification, which is another mode for the loss of substance, and in such cases it seems to owe its taking place of mortification to a degree of strength or vigour superior to that where mortification takes place, for, although it arises often from weakness, yet it is an action, while mortification is the loss of all action. In many cases it finishes what mortification had begun, by separating the mortified part These two modes of absorption—the interstitial and the progressive—are often wisely united, or perform their purposes often in the same part which is to be removed, and this may be called the *mixed*, which I believe takes place in most cases, as in that of extraneous bodies of all kinds coming to the skin, also in abscesses, when in soft parts It is the second kind of interstitial absorption, the progressive and the mixed, that become mostly the object of surgery, although the first of the interstitial sometimes takes place so as to be worthy of attention This operation of the absorption of whole parts, like many other processes in the animal economy, arising from disease, would often appear to be doing mischief, by destroying parts which are of service, and where no visible good appears to arise from it * * * but in all cases it must still be referred to some necessary purpose, for, we may depend upon it that those parts have not the power of maintaining their ground, and it becomes a substitute for mortification, and, indeed, in many ulcers we shall see both ulceration and mortification going on, ulceration removing those parts that have power to resist death" (pp 444, 5)

As regards "the absorption of whole parts from disease, it would appear," says HUNTER, "that they are capable of being absorbed, from five causes first, from parts

being pressed, secondly, from parts being considerably irritated by irritating substances, thirdly, from parts being weakened, fourthly, from parts being rendered useless, fifthly, from parts becoming dead " (p 446)

"The dispositions of the two parts of the living body, which absorb and are absorbed, must," says HUNTER, "be of two kinds respecting the parts, one passive and the other active. The first of these is an irritated state of the part to be absorbed, which renders it unfit to remain under such circumstances, the action excited by this irritation being incompatible with the natural actions and the existence of the parts, whatever these are, therefore become ready for removal, or yield to it with ease. The second is, the absorbents being stimulated to action by such a state of parts, so that both conspire to the same end. When the part to be absorbed is a dead part, as nourishment or extraneous matter of all kinds, then the whole disposition is in the absorbents (p 446) Many parts of our solids are more susceptible of being absorbed, especially by ulceration, than others, even under the same or similar circumstances, while the same part shall vary its susceptibility according to circumstances " (p 447)

"Progressive absorption is divisible into two kinds, one without suppuration, and the other with * * * The absorption which does not produce suppuration may take place, either from pressure made by sound parts upon diseased parts, or by diseased upon sound parts " (p 454) The absorption attended with suppuration, "which I call *ulceration*," * * * is connected with the formation of pus, being either a consequence of it or producing it, and is that which in all cases constitutes an ulcer. It is this which principally constitutes the progressive absorption. This differs from the foregoing in some circumstances of its operations. It either takes place in consequence of suppuration already begun, and then the pus acts as an extraneous body, capable of producing pressure, or absorption attacks external surfaces from particular irritations or weakness, in which case suppuration, forming an ulcer, must follow, let the cause of that breach or loss of substance be what it may " (p 456)

"This process of ulceration or absorption with suppuration, is almost constantly attended by inflammation, but it cannot be called an original inflammation but a consequent, which gave rise to the term 'ulcerative inflammation'. It is always preceded by the adhesive inflammation, and perhaps it is simply this inflammation, which attends it " (p 457)

"The effect, then, of irritation, as above described, is to produce first the adhesive inflammation in such parts as will readily admit of it, and, if that has not the intended effect, the suppurative takes place, and then the ulceration comes on to lead the matter already formed to the skin if it is confined " (p 458) "Any irritation which is so great as to destroy suddenly the natural operations of any one part, and the effect of which is so long continued as to oblige the parts to act for their own relief, produces in some parts, first, the adhesive inflammation; and, if the cause be increased or continue still longer, the suppurative state takes place, and all the other consequences, as ulceration, or, if in the other parts, as secreting surfaces, then the suppurative takes place immediately, and, if too violent, the adhesive will succeed, or, if parts are very much weakened, the ulcerative will immediately succeed the adhesive, and then suppuration will be the consequence. This species of ulceration in general gives considerable pain, which pain is commonly distinguished by the name of soreness, * * * but it does not attend all ulcerations, for there are some of a specific kind, which give little or no pain, such as the scrofula, but, even in this disease, when the ulceration proceeds pretty fast, it gives often considerable pain therefore the pain may in some degree be proportioned to the quickness of its operation. The greatest pain which in general attends this operation arises from those ulcerations which are formed for the purpose of bringing the matter of an abscess to the skin, as also where ulceration begins upon a surface, or is increasing a sore whether the increase of pain arises from the ulcerative inflammation singly, or from the adhesive and ulcerative going on together in the same point, is not easily determined, but, in some cases, these three are pretty rapid in their progress, and it is more than probable that the pain arises from all these causes. In those cases where ulceration is employed in separating a dead part, such as sloughing, exfoliation, &c , it is seldom attended with pain perhaps it may not be easy to assign a cause for this " (p 459)

The following are some of TRAVERS's observations on this important subject—
" Ulceration, when it occurs, is consecutive to adhesion and suppuration, in almost

all cases, and, although suppuration may now and then pass without ulcerations, in the same manner as adhesion prevents suppuration, yet the frequent case of ulcerative inflammation succeeding to abscess, and the very rare existence of ulceration without pus, constitute the ulcerative, third in order, of the processes of inflammation" (p 187)

"Ulcerative absorption never occurs but as an inflammatory process, and the action of the absorbents in this process is therefore exclusively a morbid one, and generally partakes of an increase proportionate and corresponding to the opposed action of morbid secretion" (p 188)

"The ulcerative, being a purely vital action of the absorbents proper to the part affected, goes on progressively, either by perforation of the substance, or by an encroachment on the surface, or by undermining and separating parts prepared by disorganization or actual death from being cast off. The texture of the part determines which of these modes of action is employed. The cornea, the cartilage, and bone present the penetrating and circumscribed, foveolous or fossulated ulcer, a pit or chink, the cellular membrane presents the hollowing and undermining process, as in the sinuses and pouches of abscess in cellular parts and on the margin of indolent ulcers, also between the articular extremities of bones and their cartilages, the spreading or superficial ulceration is best exemplified in the skin. But it is always by the absorbents proper to the inflamed surface that this action is carried on" (p. 190.)

"The ulcerative process stands between the life and death of parts subjected to its action, and administers to either, according to the circumstances of the case; being the instrument of reparation in the suppurative and adhesive inflammation, and of separation and removal of the waste and decayed, in the suppurative and gangrenous. It is the agent of granulation in the former, of sloughing in the latter, case, suppuration being the common link by which these extreme processes are connected. Without granulation ulceration is a wasting process, with it, a repairing one. In like manner, ulceration without suppuration is a devastation without means of control or repair" (pp 191, 2)

"An ulcer is a patent and familiar illustration of the pathology, not only of the ulcerative, but of all the processes of inflammation, and, as it is that vital action by which not only the dead are separated from the living, but the living are removed, which have undergone such organic changes, or lost so much of their vital power as to be incapable of resisting absorption, it may be regarded, as before observed, as an agent for life and death, and, if in one case the 'natural surgeon,' (HUNTER,) in another the natural destroyer" (p 196)]

19 Hardening (*Induratio*, Lat., *Verhartung*, Germ., *Induration*, Fr.) occurs when during inflammation the fluids effused into the cellular tissue (par 4) collect, thicken, and connect the walls of the cells together. Vessels pass into the connecting mass, which becomes organized, and the nutrition of the swelling depends on these vessels. If they are numerous or much expanded, the volume of the part is correspondingly increased, and permanent coagulable lymph is deposited, fatty or even bony masses are produced. If the walls of the cells become firmly united together without further deposit in the swelling, the hardened part sometimes becomes smaller than in the healthy state. The hardness of the indurated part varies according to the quantity of lymph effusssed in the cellular tissue, according to the structure of the part, according to the course of the previous inflammation, and the duration of the hardening. The skin upon the swelling is commonly not changed. The vessels, however, may be varicose, or the skin itself may be intimately united with the swelling. In this manner are formed, consequent on inflammation, various degenerations, enlargement of parts by hypertrophy, sarcomatous, steatomatus degenerations, and so on.

20 In the hardened parts, if no peculiar irritation exist, the sensibility is lessened, the circulation seems to proceed but imperfectly, because

the nerves are completely enveloped in the plastic mass which connects the several parts, and the more minute vessels are closed hence the temperature is lower, often sensibly so to the patient himself Sometimes not the least inconvenience arises from the hardening, but it may run into inflammation, ulceration, and cancer (a)

In every part inflammation may run into hardening, but especially in long continued insidious inflammations, in organs which possess a low degree of vitality, in glands, and those organs in which the very numerous ramifications of vessels are surrounded with dense cellular tissue, in persons of atrabilious constitution, who have had much mental anxiety, have been subject to scrofula or other diseases which depend upon unnatural mingling of the juices

21 The transition of inflammation into *Softening* (*Erweichung*, Germ.) produces changes directly contrary to those caused by hardening, viz., diminished cohesion and consistence—liquescence It occurs only in long continued dyscratic and cachectic inflammations, it is always connected at the onset with collections of serous, not plastic matter in the parenchyma of the part, which is therefore sometimes loosened up and thickened, or it consists in actual deliquescence and dissolution of the parts, probably consequent on diminished or changed nervous influence It may, to a certain extent, be considered as the intermediate condition between ulceration and mortification The softer and looser the texture of an organ, so much the more readily does softening take place, though it also occurs in hard organs, for example, in the bones childhood is most subject to it In many swellings softening precedes and accompanies their giving way

22 *Mortification* (*Gangrēna*, *Sphacelus*, Lat., *Brand*, Germ., *Gangrēne*, *Sphacèle*, Fr.) is the passage of inflammation into partial death, and the mortified part is subject to the general chemical laws We usually distinguish with the name of mortification two conditions, viz., the *hot Mortification*, (*Gangrēna*, *heissen Brand*, Germ., *Gangrēne chaude* ou *Asphyxie des parties*, Fr,) in which the living power is not perfectly extinguished, and in which it may be restored to its natural action, (here there is but a certain degree of inflammation,) and the *cold Mortification*, (*Sphacelus*, *kalten Brand*, Germ., *Gangrēne froide*, ou *Sphacèle*, Fr,) in which the part is actually dead

[The division here employed by CHELIUS is that proposed by Dr JOHN THOMSON TRAVERS objects to the terms mortification and sphacelus on the following ground —“I do not,” says he, “employ the term ‘mortification’ because it is not technically explicit, and has been vaguely and indiscriminately used Nor shall I use the term ‘sphacelus,’ because gangrene is a sufficient synonyme, if the term gangrenous inflammation be accepted, which presents the stages of recoverable and irrecoverable, threatened and devitalized texture A gangrened part is never restored By the arrest of gangrenous inflammation, the gangrene may be circumscribed, and, by the supervention of other processes, the dead may be cast off, and the living part repaired with more or less loss of substance The special use of the term sphacelus has been to designate a state of utter death, in which the part becomes subject to chemical changes, as if severed from the body, and such meaning I affix to the substantive term ‘gangrene’” (p 208) Hence it will be observed that TRAVERS’s gangrenous inflammation, and his gangrene, are synonymous with CHELIUS’s hot mortification, and with his cold mortification —J F S]

23 Mortification truly consists in the extinction of vascular and nervous activity, in consequence of which partial death ensues This transition is to be feared in unusually severe and quickly developed inflammations with well marked general symptoms in young powerful subjects, and after the operation of severe injuries, in persons with the general appearance of weakness, if the redness of the inflamed part be bluish, of a dirty yellow, the pain slight, and if it be accompanied with typhus If the pain quickly increase to a great degree, the inflammatory swelling be hard, dry, and very tense, the heat intolerable, the skin dark red, often brownish, the fever extraordinarily severe, and no appearances ensue which lead to the hope of the inflammation terminating in suppuration, then the signs of incipient exhaustion become manifest The acute pain becomes dull, aching, stretching, there is still indeed circulation, but its current gets slower and slower, and at last stops altogether The redness therefore becomes deeper, more dusky, and farther extended, the warmth diminishes, the swelling at first hard and tense, becomes soft, doughy, oedematous, the cuticle rises in blisters, containing a dark-coloured brownish fluid In this condition the part has not yet lost all its sensibility and warmth, the vital activity may therefore be reawakened and reparation effected The pulse is small, quick, and loses all fulness and hardness, the patient is depressed, is uneasy, has a languid countenance, cold sweats, dry, dirty tongue, unquenchable thirst, frequently burning hot skin, the features at the same time become pinched, and the urine is thick When exhaustion of the living activity and fully developed mortification takes place, then the pain ceases entirely, the colour of the part becomes blue, ash gray, or even black, the bone assumes a light white dirty yellowish, or even black spotted appearance By the decomposition of the parts still covered with skin, and the evolution of the gases of mortification an emphysematous swelling is produced, the part becomes quite cold, and the general appearances of exhaustion are present in a higher degree, the mortification either spreads farther and death ensues from exhaustion, or on the confines of the slough is produced a bright redness, suppuration, and by the operation of the absorbing vessels a groove, becoming deeper and deeper, by which the slough is thrown off

[This is TRAVERS's acute gangrene He observes also, that "if the inflammation occupies a circumscribed space, it is generally consecutive upon, and defined by, the adhesive inflammation, if it appears in several contiguous spots or patches, the whole of the intervening surface, and more or less of the subjacent and surrounding part, partakes of the inflammation and is marked for destruction, if, as often happens, it is of irregular size and shape and the surrounding margin darkly discoloured, tumid and painful to the touch, it is spreading, and rapidly travels along a continuous surface without check, to the destruction of texture, and generally of life * * * In some rare instances, gangrenous inflammation takes possession of an entire structure, as, for example, hand or foot, or even a limb up to its connexion with the trunk, and beyond it, and the indication is the sudden subsidence of agonizing pain, change of colour to a pale bluish hue, loss of temperature and of sensation, so that the limb looks and feels like gray or clouded marble I have seen in two cases the upper and lower extremities of the same side so affected in the same patient The rapid dissolution of the vital principle in such instances, anticipates the march of disorganization, such cases are generally depending on nervous prostration from injury or operation, attended by peculiar circumstances of aggravation, or, yet more frequently, peculiar temperament" (pp 209, 10)

24 The decomposition of the mortified part is accompanied by a peculiar exhalation, different in smell from that occurring in the decomposition of dead bodies, the cause of which seems to depend on the higher temperature to which the mortified part is exposed. The destruction of the mortified part occurs in different ways. 1st, the slough shrivels up, the cuticle does not separate, the fetid exhalation is less, the pain is sometimes very severe (*Diy Gangrene*, *Trockner Brand*, *Germ*, *Gangrène sèche*, Fr.) 2d, the mortified part increases in bulk, the cuticle rises in blisters, which burst and discharge a quantity of stinking ichorous fluid (*Moist Gangrene*, *Feuchter Brand*, *Germ*, *Gangrène humide*, Fr.) 3d, all the organic structures without distinction are changed into a glutinous grayish white or ulcerous mass (*Hospital Gangrene*, *Hospital-Brand*, *Gerin*, *Pourriture d'hôpital*, Fr.)

[In severe bruises, and occasionally when, after the swelling of a limb consequent on a fracture, the bandages confining splints have become tight and caused much pressure, vesications filled with bluish or bluish-black fluid occur. This often excites alarm, and is mistaken for mortification, but it is of little consequence. It is only requisite to puncture the blisters with a needle, evacuate the fluid, and apply lead wash for a few days, when all soon becomes sound. If the vesications are left unemptied, they often produce inconvenient superficial sores, which heal with the use of zinc ointment.—J F S.]

25 Mortification may be produced by all hurts which cause a too high degree of inflammation, obstruction of the circulation, weakness, oppression of the nervous activity, and thereby loss of life of a part, for instance, too irritating treatment of inflammation, checking of the circulation by ligature, too tight bandaging, pressure kept up by unyielding aponeuroses, violent operation of heat and cold, malignant character of the inflammation where in seeming mildness of the symptoms mortification often occurs, of which the cause is generally unknown, but sometimes depends on hurtful matter in the bowels, farther, from a great degree of weakness, degeneration of the juices, scurvy, and so on, malignant, putrid fevers, great age, severe bruises and concussions, by which the part is filled with stagnant juices, ligature and ossification of the vessels, (which may without inflammation give rise to mortification,) certain fluids extravasated from their cavities, as urine, bile, feculent matter, bad foul air and contagious influences.

[BRODIE (a) enumerates sudden loss of blood as sometimes causing mortification, and in proof mentions the case of a man who, whilst very tipsy, one evening, was bled to the extent of three pints, when he became very ill, and the next morning his toes and feet up to the insteps were mortified. They sloughed off, however, and he did well (p 635.)

TRAVERS mentions among the causes of mortification "such deep and extensive effusions as compress and annihilate the internal circulation of the part. Thus, I have seen," says he, "a subfascial effusion, following a severe strain of the fore arm, producing a spreading gangrenous inflammation of the extremity to within a hand's breadth of the axilla, and similar cases, of suppuration, between the deep-seated muscles of the thigh, I have known terminate suddenly in gangrenous inflammation of the entire limb to the groin. Injuries of nerves, particularly, are liable to be followed by gangrenous inflammation of this I have also seen some marked examples. Baron LARREY found reason to attribute the gangrene of the foot following the operation for popliteal aneurism to the nerve having been injured or included in the ligature" (p 214.)

I recollect many years ago seeing a case of mortification of the whole lower ex-

(a) Lectures on Mortification, in London Medical Gazette, 1840—41, vol 1

tremity, consequent on a bayonet wound of the femoral artery, in which the death of the limb seemed to result from the slow effusion of blood and gradual distention first of the fasciae, and subsequently of the skin, which occupied many months. The man was a sailor, and during a homeward voyage from the East Indies dropped a bayonet point into his thigh. The ship, being without any surgeon, the captain bandaged the thigh tightly up, and effectually prevented external haemorrhage for five or six weeks. When he reached home, he was brought to St Thomas's Hospital, and, on removing the bandage, the wound was found united. The limb was much swollen up to the pelvis, but his health had not suffered much. It was thought advisable to wait and see what might be the result. The limb increased in size, the skin gradually became more and more discoloured, and gangrenous in patches, indistinct fluctuation was perceived, he was slowly worn out, and died. On examination, the whole limb was found distended with blood, some of which was coagulated, some fluid, and other mixed with pus. On removing the clots, which were principally about the femoral artery, a spurious aneurism was found, the sac formed by the clot being as large as a hen's egg around the wound made by the bayonet in the artery, which had not closed, and was rather bigger than a crow-quill. On one side of the sac, close to the vessel, was a small aperture, by which blood had continued escaping probably up to his death, into the surrounding soft parts.

Mortification of a limb, or at least of that part of it in the neighbourhood of an aneurismal sac (which is not uncommon if from any cause the vessel have not been tied at the proper time) in general depends simply on the distention from effusion, which at last bursts the skin.

Mortification occasionally happens in simple fracture, from slow but continued effusion, and without wound of the principal artery or arteries of the limb. I have seen this once in a flour-porter, whose leg was broken by being jammed with a cart-wheel, his constitution speedily took the alarm, and, though incisions were made through the skin to relieve the tension, he gradually became worse, and sunk into hectic, in which state his limb was removed, but he died a few hours after. Although from the first no pulsation could be felt in the tibial arteries, yet the examination after death showed them uninjured and undiminished in size.

Mortification I have also seen in one or two instances occurring from splints having been applied previous to the substance of the swelling after fracture, and not proportionally loosened as the swelling increased.

The two following are cases of mortification, resulting, the first from simple continued fever, and the second probably after scarlet fever —

CASE 1 — J J, forty-eight years of age, a hatter by occupation, of intemperate habits, is now —

Aug 1 Slowly recovering from an attack of fever which commenced seven weeks since. A sore on the inner ankle of the left leg, which he has had for eighteen months, about five weeks since became sloughy, and the surrounding skin was attacked with gangrene, which continued spreading till it has attained its present size, that of the hand. As yet there is not any line of demarcation, and the wound is very painful though cleaning. He is much emaciated, very weak, without appetite, cannot rest, his pulse extremely quick and almost imperceptible, (this may perhaps arise from exhaustion in bringing him to the hospital,) the countenance sunk and pallid, surface warm, but occasionally bathed in profuse sweats, tongue clean. I ordered for him five grains of carbonate of ammonia, with ten minimis of tincture of hyoscyamus every six hours, six ounces of brandy and a pint of beef tea, with arrow-root daily. To the wound, chlorate of soda lotion and linseed-meal poultice.

Aug 2 Better, but without sleep. Twenty minimis of tincture of opium at night.

Aug 4 Is improving, the wound is free from pain, and two or three granulations are seen in its centre, the slough has rather increased. An abscess which has formed on the outside of the knee was opened, and a teaspoonful of thin but otherwise healthy pus discharged, pulse improved, he complains of sore throat, with difficulty in swallowing, and disposition to retch, but he takes plenty of fluid though he cannot manage solid food. As he wished for some porter, a pint daily was ordered. The mixture discontinued, but twenty minimis of tincture opium in camphor mixture directed to be taken at night.

Aug 5 Is improving, and yesterday began taking a mutton chop. The slough has cleaned from the wound, leaving a sore surface which, occupying nearly two-thirds of the back and inner part of the leg, is now beginning to granulate. As the

pus seemed disposed to bag on the outside of the instep, in consequence of the limb lying on its outside, the skin was cut through to prevent this, and a small abscess below the tubercle of the shin-bone opened

Aug 15 Improving, and desiring more nourishment. Two pints of beef tea daily

Aug 22 The wound almost completely cleaned, but the granulations are flabby and pale An abscess which has formed at the upper part of the thigh was opened, and about an ounce of good pus evacuated He wished to have more porter, which was therefore increased to two pints, and the brandy diminished to four ounces Nitric acid wash to be applied to the wound

Sept 2 During the last two or three days the granulations have been receding, and have now exposed a large portion of the shin-bone, which is apparently dead, a considerable part of the Achilles' tendon has become gangrenous The drain upon his constitution has lately been much increased, and it is now a question whether amputation be not necessary, and also whether he is in a condition to bear it

Sept 6 The wound is more healthy, and the gangrene seems to have stopped Another abscess, merely superficial, which had formed about the middle of the thigh, burst yesterday

Sept 11 Sleeps well and feeds well, but does not get flesh, there has been a slight increase of sloughing on the instep, but it is now cleaning The discharge from all the wounds is very free, and the granulations rather more florid

Sept 13 Appetite failing An abscess on the inside of the calf, which seems to extend among the muscles, opened, and about three ounces of pus discharged

Sept 20 Still declining, and during the last two or three days sloughing has recurred Amputation was therefore proposed, but he would not consent

Sept 24, 9 A. M. Much exhausted, pulse quick and scarcely perceptible, countenance pallid, voice weak, the sore quite bleached I ordered him brandy and egg, as much as he could be induced to take, which somewhat revived him, and afterwards he took some wine At 1 P. M. bleeding occurred, probably from the saphenous vein, as it traversed the wound, it was, however, easily checked, and did not recur He continued gradually sinking, and, on

Sept 25, 11 A. M. He died

CASE 2.—L U, Twenty-seven months' old, of scrofulous habit, has been weaned about thirteen months, and, like the children of the poor generally, since fed on bread and butter, with tea She has been always healthy till about sixteen days since, when the whole surface of the body became so scarlet that it was supposed to have scarlet fever Two days after she was observed to point continually to the left side of her chest, and on examination there was found on the axillary margin of the pectoral muscle a dark-coloured swelling, in circumference about the size of a small tea-cup Soon after the redness of the body subsided, but her belly was enlarged and the legs swollen It would, therefore, seem probable that the previous disease was scarlet fever

At the present time (*Sept 8*) there is a well-formed brown slough, surrounded with a dusky-red elevated edge of skin with similar inflammation extending about half-way down the left arm, also upon the neck and back, reaching as far as the right shoulder The cellular tissue of the right arm-pit hard, inelastic, and painful, as if another slough were likely to take place A layer of the slough was removed, and strong nitric acid applied with a feather, after which it was covered with nitric acid lotion and linseed-meal poultice To the back of the neck a linseed poultice with acetate of lead wash was applied Five grains of extract of bark every four hours, an ounce of gin every six hours, were given in arrow-root

Sept 10 The sloughy sore is cleaning, but the hardness on the right shoulder has increased, the inflammatory blush has spread considerably, and now covers all the chest and the belly as far as the navel, extending down on either side towards the flanks On the left arm it reaches below the elbow, and on the right half down the upper arm The cellular tissue on the loins is edematous As the gin is rejected, a couple of teaspoonfuls of port wine with syrup was ordered frequently during the day, but not to exceed four ounces Two grains of mercury with chalk, and four grains of rhubarb with as much carbonate of soda, nightly, were prescribed

Sept 11 Has had three dark-coloured stools, but her appearance not improved She continued sinking, and about 4 P. M. died

No opportunity of examining her body occurred.—J. F. S.]

26 The mortification dependent on very low vital activity which generally attacks the feet and more rarely the hands of old people (*Semle Gangrene, Gangrena senilis*, Lat) must be considered as peculiar Under this name, however, conditions have been classed together which, at least in reference to their origin, must be distinguished from each other

27 In persons who in every respect have lived irregularly, and whose living powers are in a great degree exhausted, who have suffered much trouble, and had irregular gout, specially in the feet and erysipelatous inflammation with dusky redness and severe pain arises after any injury, viz., after the violent action of frost, contusion or wound of the toes in cutting the nails or corns This redness spreads more or less, forms blackish bladders on one or more toes, the cuticle separates, and the exposed true skin exhibits a deep dusky redness The inflammation usually spreads still farther, but slowly, attacks one after another all the toes, and usually in its progress the part next to be attacked swells, and is excoriated Sometimes it is circumscribed, in which case the toes dry like mummies and fall off Most commonly the mortification spreads over the ankle-joint, and in its farther extension death ensues from exhaustion it may, however, be confined to different parts, and nature may bring about a separation of the mortified part The pain is usually severe, and is soon accompanied with fever

28 In this kind of mortification the depressed condition of the vascular and nervous activity must be considered as the actual cause why in the operation of the above-mentioned hurts, the inflammation quickly passes into mortification and drying up, mostly of the parts farthest distant from the centre of circulation This mortification exhibits some similarity to the dry mortification of frostbite

29 The other form of this mortification happens without any previous local injury, but after general indisposition of more or less duration, such as depression of spirits, listlessness, unquiet sleep, debility, sparing, high-coloured urine, laborious breathing, palpitations of the heart, anxiety, pain at the pit of the stomach, small weak, irregular, or intermittent pulse, shiverings, or constant internal cold In the part in which subsequently the gangrenous drying appears, pains of varying severity come on, sometimes accompanied with cramps in the extremities these go on for weeks, and even for many months, before the local destruction is observed Or the patient has a sensation of cold in his extremities, a recurring sensation of being asleep for a longer or shorter time, insensibility to external irritation of fingers and toes, entire loss of motion Without any local case the patient observes on his toe or on his finger a black blackish-brown or brownish (never dusky-red according to BALLING) colour, without any tense swelling The part dries, the cuticle loosens itself, the part becomes quite black and lifeless The prognosis of the disease varies often is only one toe or one joint thrown off, or it attacks all the toes, confines itself to the foot, or spreads up to the knee The process of separation is connected, as in common mortification, with a bounding red line and light suppuration This kind of mortification may occur on various parts at the same time The same appearances take place in children the extremity becomes black-blue, its tempera-

ture diminishes, and it seems to be completely atrophied In one case BALLING observed a blackish-yellow colour and dried skin Sometimes a lower degree occurs, and then from the first the extremities are livid and oedematous.

[This form of mortification is TRAVERS's chronic gangrene, which he says "is generally an idiopathic affection, & e independent of injury, and which he has never known to be traumatic * * * The main distinction between this and acute gangrene is, that from the first the part thus affected losing its temperature and colour becomes dry, tough, and shrunken, instead of moist, soft, and swollen, and takes on a yellow or blackish-brown appearance, nearly resembling that of a mummy" (p 211)]

30 This form of mortification or mummy-like drying up is always the consequence of an exhaustion in the peripheral parts of the vascular and nervous systems This condition occurs most commonly in old decrepid persons living anxiously and in want of food , more frequently in men than in women , in persons who have prematurely exhausted themselves by excessive debauchery , in those subject to the gout, in whom, perhaps, the ossification of the arteries, so often observed in this kind of mortification, seems to be connected this disease, however, may occur in every age if the above conditions are present This kind of mortification may arise suddenly, and without any previous inflammatory symptoms, by metastasis during the course of malignant fever (1) In children born with blue, cold atrophied extremities, in whom the circulation does not proceed properly it is often noticed The closing up of the blood vessels is, according to BALLING (a), constantly observed (2) Organic changes in the heart and aorta are also invariably present (3)

(1) I have seen one case in a man thirty-five years old, in whom during the progress of abdominal typhus, the right foot up to the middle of the leg, became suddenly pale, icy cold, senseless and motionless, shrivelled, subsequently quite black, and the dry gangrene reached to the upper third of the leg, where it stopped

(2) The closing up of the arteries is always present in dry gangrene, as was observed in former times , it may be also in certain cases the special cause of the mortification, and consequence of the inflammation of the arteries, (*arteritis*,) or of the capillary vessels, first described by DURVY TREN (b) It cannot, however, be considered as the general and constant cause , for, in many cases, there is not a single previous appearance indicating inflammation of the arteries, and their closure is caused by the mortification, and consequent to it Compare also HECKER (c)

(3) I have observed a case of dry gangrene in a man about forty years old, which extended up to the middle of the leg, where it stopped, and the part separated There had existed for a long time undoubted symptoms of organic disease of the heart

[BRODIE (d) mentions a case of mortification of the leg up to the middle of the thigh, which commenced with a sense of pricking numbness and weight, and on the following day the limb had mortified, "no vesications formed on the foot, it was not swollen, and no part became putrid except just a little in the middle of the thigh, where was a great mass of soft parts The limb dried, the skin assuming a brownish colour, being at the same time hard and semi-transparent, so that the white tendons could be seen shining through it It was in fact what has been called a case of dry gangrene" The patient's powers failed, and he died at the end of six weeks Upon examination, BRODIE "found marks of inflammation every where around the principal artery and vein of the limb From the bifurcation of the large trunk down to the middle

(a) Ueber die *Gangrena senilis* in Journal von v GRAEFE und v WALThER, vol xiv p 42 ungen über die brandige Zerstörung durch Behinderung der Circulation des Blutes Stuttg, 1841

(b) Transactions Médicales, May, 1833

(c) Nosologisch therapeutische Untersuch-

(d) As above

of the thigh, the artery was obliterated, being completely filled with coagulated lymph, evidently effused from inflammation; closely adhering to the inner surface, but with some admixture of red coagulum. The vein was filled with lymph and obliterated in the same manner as the artery. There had been inflammation of the sheath of the vessels, in consequence of which the artery and the vein adhered closely to each other and to the surrounding parts. I suppose that the nature of the case is plain enough there had been inflammation of the artery and the vein, and the obliteration of the artery was to so great an extent as to cut off the supply of blood, not only through the trunk, but through the anastomosing branches" (p 635.) BRODIE also points out the cause of the distinction between dry and moist gangrene—"If mortification be the result of inflammation or of venous obstruction, there is always an effusion of serum before the parts completely dry, in the form of vesication of the skin and œdema of the cellular membrane, and then, when the parts die, being infiltrated with serum, they readily become putrid. But here (in inflammation of the arteries) the blood is prevented from entering the limb, so that there can be neither vesication nor effusion of serum into the cellular membrane, and the dead parts dry readily from the absence of moisture" * * *. Gangrene from arterial inflammation is comparatively a rare disease, and may occur at any period of life, whereas the gangrene of old age arises, as repeated dissections have enabled me to determine, entirely from other causes" (p 636.) From this latter observation it will be perceived that BRODIE does not agree either with CRUVELHIER (*a*), who says, that "coagulation of the blood is, after his observations, the essential character of incipient arteritis," (p 394,) or with DUPUYTREN (*b*), who says that, in such cases, "Pathological anatomy always shows the existence of inflammation of the arterial tunics. This phlogosis may doubtless occur in arteries which are unhealthy, indurated, ossified, as often met with in old persons, but it appears also in the arteries of young people without trace of these disorders. In a word, it may coincide with the calcareous incrustation of the vessels and with age, or it may be independent of both conditions" (p 484.)

I have seen but a single case of *arteritis*, which happened in a young man of twenty years. It differed from BRODIE's case in not having exhibited the slightest appearance of gangrene, and, on dissection, the brachial artery was found partially obliterated, and shrivelled to a narrow cord, precisely as if a ligature had been applied upon the subclavian artery. Although, in this case, the pulse at the wrist ceased suddenly, yet the circulation was undoubtedly carried on by the collateral circulation, and thus gangrene prevented. I shall refer to this case again when considering inflammation of the coats of arteries (p 74)—J F S

A most remarkable case is given by SOLLY (*c*) of gangrene, which commenced in a boy about three years old, and, gradually spreading from limb to limb, destroyed him when four years old. In four months from its commencement the disease had amputated the left foot above the ankle, as also two toes of the right foot, and upon the right calf and knee were hard gangrenous spots. The right fore arm was cut off through the middle of the ulna, and the radius had dislocated itself from the elbow joint, the whole of the left fore arm and part of the upper arm were gangrenous. There was a dusky spot on the nose upon the scar left by a gangrenous spot which had formed previously, and separated. In the sixth month the left leg, which had become quite gangrenous, was thrown off below the knee, and the toes of the right foot had also sloughed off. The right ulna had come off at the elbow-joint, and the left arm had amputated itself through the middle of the upper arm. The gangrene on the nose had reappeared, but been checked. For a short time there seemed a little rest in the gangrenous process, but it was again set up, and by the twelfth month the left leg had become gangrenous to the middle of the thigh, and all the soft parts separated, leaving the bone bare. The right leg had mortified to the middle of the calf, and the right foot separated above the ankle. The stumps of both arms had become gangrenous up to the shoulders. In the beginning of the following month the child died. Careful examination of the body did not show any organic disease, but the child had become much emaciated. The stumps of the arms had

(*a*) Maladies des Artères, in Dictionnaire de Médecine et de Chirurgie Pratiques, vol III p 394

(*b*) Leçons Orales de Clinique Chirurgicale, vol II

(*c*) Med Chir Trans, vol xxii. p 253, 1839, vol xxviii p 237, 1840

nearly healed, but in the lower limbs the bones protruded, and the cure was less perfect]

31 Mortification from continued pressure, or from constant lying upon one part (*gangrēna ex decubitu*) occurs more readily, the weaker the patient, and the less cleanly and smooth the bed is. On those places where the pressure acts, most commonly, therefore, on the sacrum and coccyx, the great trochanters, the shoulder-blades, elbows, heels, and so on, a limited redness appears, with pain more or less severe, the skin is destroyed by ulcerative absorption, and a dry slough is formed, which is dissolved in the suppuration set up around it. Should the pressure continue, and the general weakness be great, (for example, in typhus fever,) the destruction spreads very extensively, and in many cases death is thereby accelerated or even caused.

32 A special mention is required of that mortification which, in certain localities, in very wet and humid years, when the rye is infected with the blight, called "cockspur," occurs in the lower extremities, with a constant sensation of itching, great burning, and a darting pain, sometimes with redness and swelling, consequent on which the parts become cold, senseless, black, mummy-like, and shrivelled up. In rare cases this disease has been also observed in the upper extremities. During the course of the disease general symptoms, fever, delirium, and so on, frequently arise. Oftentimes the mortification becomes defined and the part is thrown off, and often it spreads up to the hip-joint.

[A very interesting account of mortification from the use of rye-bread affected with cockspur (*secale cornutum*, Lat., *Mutterhorn*, Germ., *cigot*, Fr.) has been given by THOMSON. "This is," says he, "a species of mortification which has not been observed in this country, but it is well known and has been frequently observed in different parts of the continent of Europe, particularly in France, where it has been repeatedly known to prevail in some districts as an endemic disease" (p. 538.) PEREIRA (a) supposes this disease is referred to in a passage he quotes from SIGEBERT. "1089, a pestilent year, especially in the western parts of Lorraine, where many persons became putrid, in consequence of their inward parts being consumed by St Anthony's fire. Their limbs were rotten and became black coal. They either perished miserably or, deprived of their hands and feet, were reserved for a more miserable life." He also refers to a similar passage in BAYLE, with the addition, that "the bread which was eaten at this period was remarkable for its deep violet colour" (part II p. 595.) THOMSON says, the disease was first noticed by DODARD in 1676, then by SAVIARD (b), in 1694, and by NOËL (c), in 1710, in the Hôtel Dieu at Orleans, of which they were both surgeons, in 1709 and 1716 it appeared in Switzerland, and was described by LANGIUS (d), QUASSOUD, and also BOSSAU, described it on its appearance in Dauphiny in 1709. DUHAMEL (e) mentions that in 1748 not more than four or five persons out of a hundred and twenty who had been attacked escaped with life. ELLIOTSON some years since had, in St Thomas's Hospital, a case of gangrene of the leg after using ergot, but he informs me that on examination after death the arteries of the limb were found ossified. It might, however, have been the immediate exciting cause of the disease.

Although there was no doubt that in man the cockspur would produce gangrene, MODEL (f) a Russian, made experiments which led him to conclude that rye, damaged with cockspur, had not the power of exciting gangrene in brutes. This remarkable statement induced the Royal Society of Medicine at Paris to employ

(a) Elements of Materia Medica, part II
London, 1840 8vo

(d) Descriptio Morborum ex esu Clavorum
Secalinorum

(b) Journal de Savans, 1676, p. 76

(e) Mémoires de l'Académie Royale de

(c) Mémoires de l'Académie Royale des
Sciences de Paris, 1710; p. 61.

Paris, 1748, p. 528

(f) BOMARE, Dictionnaire d'Histoire Na-

turelle, vol. xix

TESSIER (*a*) to visit those countries where the disease was prevalent, and to institute experiments to determine the fact, and the result showed that brutes eating it were destroyed by gangrene, but, in all the animals upon which it was tried a certain quantity, varying according to circumstances, of the cockspur was required to be taken, in order to produce the effect, and, as THOMSON says, "this afforded also a simple explanation of the fact, that persons might live for a considerable time upon rye affected with cockspur without suffering any sensible injury from its use" (p 547) PEREIRA states, however, that "there are not wanting cases apparently showing that spurred rye has no injurious action on animals The most remarkable and striking are those related by BLOCK In 1811 twenty sheep ate together nine pounds of it daily for four weeks without any ill effects In another instance twenty sheep consumed thirteen pounds and a half daily for two months without injury Thirty cows took together twenty-seven pounds daily for three months with impunity, and two fat cows took, in addition, nine pounds of ergot daily, with no other obvious effect than that their milk gave a bad caseous cream, which did not yield good butter These statements furnish another proof to the toxicologist that the ruminants suffer less from vegetable poisons than other mammals" (p 600)

A very curious history of a mother and five children, some of whom lost one and others both legs, as related by DR C WOOLASTON (*b*), seems to have originated in the use of discoloured clog-wheat

Ergotism, as the disease produced by the cockspurred wheat or rye is called by the French, is of two kinds, the *convulsive* and the *gangrenous*, with the latter only have we to do here, it sets in with formication, or the feeling of insects creeping over the skin, voracious appetite, coldness and insensibility of the extremities, followed with gangrene]

[32] Here must also be mentioned that mortification of the cheek which has been called *Noma* by VOGEL It is fortunately not frequent, as it is a horrible and generally fatal disease With a single exception, of the half dozen cases I have seen, all were children under four or three years old, some idiopathic, and others originating in a sloughing of the mucous membrane of the mouth, under the careless use of mercurials, and, though generally in unhealthy subjects, yet the disease also occurred in robust, well-fed children In its idiopathic form it has been well described, by DRs EVANSON and MAUNSELL (*c*), as follows—"A particular form of gangrene of the mouth without any preceding inflammation occasionally attacks infants, especially such as are feeble at birth or broken down by disease An œdematosus circumscribed swelling appears on the cheek, with a central point, more or less hard, over which occurs a dark-red spot This spot may appear on the inside or outside of the cheek, and the skin over the œdematosus part is characterized by an oily appearance An eschar forms from within outwards on the central point, and the soft parts mortify, often extensively, down to the bone, so that the parietes of the cheeks and gums are destroyed, falling off in shreds, mixed with a dark sanguineous fluid, and accompanied by a very fetid odour" (p 214) In neither of my cases, excepting the adult, did I witness the beginning of the disease, but gangrene to a greater or less extent of one cheek, involving generally the corresponding half of the upper lip, existed when the children were brought to me, the surrounding parts were tumid, hard, and of dull yellow-white hue, very similar to the characteristic colour of the countenance of patients under malignant disease I have little doubt that the mortification of the mouth and fauces after measles, mentioned by HUXHAM (*d*), as well as those

(*a*) Mémoires de la Société Royale de Medicine, 1776, p 254, 1777-8, p 587

(*b*) Philos Trans 1762, p 523

(*c*) A Practical Treatise on the Management and Diseases of Children 2d Edit Dublin, 1838 Svo,

(*d*) Reports, July, 1745

referred to by MARSHALL HALL (*a*), and by him stated to have happened after previous disorder of the digestive organs, typhus fever, or some inflammatory disease, are of precisely the same character as those resulting from mercurial influence. The little patient, if not already in a typhoid state, soon falls into it, rapidly sinks as the gangrene spreads, and quickly dies, often, indeed, before the least attempt at separation of the slough has been made. Usually three or four days are sufficient to destroy life, but, in one instance, I recollect a child of two years old having lived for a fortnight, and the greater part of the gangrenous cheek had separated, leaving one side of the cavity of the mouth completely exposed. I fully agree with EVANSON and MAUNSELL, that "no disease can be more frightful or formidable than sloughing of the mouth in children. Recovery seems impossible, when once the disease has set severely in, the child sinking beneath the constitutional disturbance, independent of the local ravages of the disorder, which, however, are often such as to render recovery not to be desired, so frightful is the deformity necessarily entailed," (p 215.)

The term *Cancrum oris* has been loosely applied both to the disease just mentioned, and also to another form of mortification commencing with ulceration, generally first in the gums, and thence spreading to the lips and cheeks. This second form alone is considered by Dr CUMMING (*b*) to be *cancrum*. He describes it as being either acute or chronic, and, if the former, more liable to be accompanied with sloughing, but the ulcerative process predominates, and by it, principally, the destruction is effected. It does not, according to this writer, attack children at the breast, nor under eighteen months, but occurs between twenty months and seven years.

The following is a short account of the case of noma in the adult alluded to above —

R I, a gunmaker by trade, was admitted under my care —

August 1, 1844 Having two superficial sores on the glans penis and a superficial sore on the back of the pharynx, sloughy and painful, so much so as to prevent him sleeping at night. He is much out of health, quick, irritable pulse, hot, dry skin, and foul tongue. He has also a very small sore, scarcely perceptible, and covered with a dry scab, on the face near the nostril. He was not seen till

August 2 Probably from not having come in, and then ordered *pulv rhei c hydr* $\frac{1}{2}$ stat, *sod carb gr xv acid citr gr x tinct hyoscyam 3ss aq distill 3jss 6ts horis, garg acid mtr*

August 6 The mixture omitted, and in its stead ordered *acid mtr* $\frac{1}{2}$ ij *inf rosar* $\frac{1}{2}$ jss *ter die pulv ipec c gr x* On

August 9 Very restless, scarcely sleeps at all, and is so feeble that he can hardly answer the questions put to him. Ordered a glass of wine and a pint of porter daily, and *morph mur gr* $\frac{1}{2}$ On

August 15 Has slept better since taking the morphia. The crust under the right nostril has increased in size and is accompanied with swelling of the surrounding parts which are of a purplish colour.

August 17 Is much worse, the lip immensely swollen and livid, but not giving any discharge, face so much disfigured that he can scarcely be recognised. The sore in the throat much worse, bowels confined. *B pulv rhei c hydr gr. xv stat, vin rubr* $\frac{1}{2}$ jv quotid

August 20 Is very feeble and unable to speak. The slough has now extended around the mouth from the nose to the chin, including the lips and part of both

(a) On a peculiar species of Gangrenous Ulcer which affects the Face in Children, in vol xv p 547

(b) Dublin Hospital Reports, vol iv p 18

cheeks. The sore in the throat has become very sloughy. Four ounces of brandy, three eggs and some arrow-root were ordered, but he was not able to take much, and gradually sunk till,

11 p m When he died No discharge at all had occurred from the lip No examination of the body was made —J F S]

[The attention of the profession in America, was first particularly directed to that peculiar affection of the mouths of children, terminating rapidly in extensive sloughing of the gums and cheeks, by Dr Benjamin H Coates, and his excellent essay on the subject, published in the second volume of the North American Medical and Surgical Journal, may be consulted with profit by the practitioner He found a solution of blue vitriol, grs xxx to the ounce of water, applied as a wash, to be more efficacious than any other medicine which he tried See also a paper by Dr S Jackson, on the Gangrenopsis, or Gangrenous erosion of the cheek, in the Medical Recorder, vol 12 —G w N]

33 Mortification occurs as a consequence of contagious influence, either by the contagious matter producing at first an inflammation which terminates in mortification, (*malignant pustule*,) or by coming in contact with the surface of a wound or sore, whereby the destruction of it is brought about (*hospital gangrene*)

34 The *Malignant Pustule* (*Pustula maligna*, Lat , *bosartige Pustel*, Germ , *Pustule maligne*, Fr) is always consequent on local contagion On the place which the contagious matter has touched, there appears in a short time prickling and a red point, which is scarcely raised above the skin The cuticle rises in a blackish vesicle, which is soon converted into a slough surrounded by a whitish or violet edge and œdematosus swelling, and spreads quickly in all directions From the very onset there is perceived in the pustule a hard nucleus, which enlarges both inwards and outwards, or only spreads laterally Notwithstanding the decided swelling, the patient complains rather of tension than of actual pain Sooner or later it is accompanied with fever, pain in the region of the stomach, nausea, vomiting, high delirium, fainting, and so on The pulse is small, irregular, and, if left to itself, the disease generally runs on to death, which in malignant cases follows very speedily It is rarely that the slough comes away, and that the cure is effected by the mere powers of nature, or that in the course of this disease the general symptoms already mentioned do not appear If several pustules are formed at the same time, especially on the neck or face, the disease is more dangerous The swelling is often here so great that symptoms of suffocation and congestion of the brain are produced In women the disease proceeds more quickly than in men At the onset a stop may usually be put to this disease , the danger increases in its subsequent course It differs from carbuncle (par 118)

The contagion develops itself in beasts which are affected with contagious carbuncle (*Milzbrand*,) it may be communicated whilst the animal is alive, or it may take place during the preparation of wool, hides, and so on The malignant pustule is therefore most commonly observed in butchers, tanners, woolbeaters, shepherds, and especially on those parts of the body usually uncovered In wet districts, in moist autumns, the disease is most common The contagion preserves its power for a long period Actual contact is not always necessary to

produce infection. The use of the flesh of such beasts sometimes does not produce any, but at other times very dangerous symptoms. This disease seems not to be communicable from one man to another, at least the facts relating thereto are not perfectly indisputable, it is also doubtful whether the general symptoms can be produced by the assumption of this contagion into the body, without the malignant pustule on the skin.

Precisely similar phenomena have been observed in reference to the transference of the poison of glanders from horses, upon which see the article entitled

ANSTECKUNG, Uebertragung des Ansteckungsstoffes von Thieren auf Menschen, in HUFELAND's Journal, vol iv part iii p 57, which contains the following three notices —

REMER, W, Ein Beitrag zu den bisherigen Beobachtungen von Krankheiten der Thiere, welche sich dem Menschen mitgetheilt haben

SCHILLING, Merkwürdige Krankheits-und sections-Geschichte einer wahrscheinlich durch Uebertragung eines thierischen Giftes erzeugten schwarzen Blatter (This notice is also in RUST's Magazin, vol ii p 480)

MEIER, Tödtliche Uebertragung des Milzbrandes auf Menschen

See also,

TAROZZI, TOMMASO, Caso di Malattia Pestiforme nata in diverse persone che convenivano in una stalla in cui era un cavallo moccioso, in OMODEI's Annali Universali di Medicina, 1822, vol xxiii. p 220

SEIDLER, Geschichte einer muthmasslich durch Uebertragung eines thierischen Krankheitsstoffes erzeugten merkwürdigen, in todlichen Brand übergegangenen Gesichtrose, in RUST's Magazin, vol xvii p 161

ECK, Beitrag zu den Erfahrungen über die schädlichen Einwirkungen des Rotz-giftes des Pferde, in Medizinischer Vereinszeitung für Preussen 1837 3d May

ELLIOTSON, JOHN, M D, On the Glanders in the Human Subject, in Med-Chir Trans, vol xvi p 171 Additional Facts respecting Glanders in the Human Subject, ib, vol xviii p 201

[ELLIOTSON has given a very excellent account of "The Glanders in the Human Subject," in which the communication of the disease from the horse to the patient is distinctly made out. He mentions six cases, the first three he considers *acute*, two of which occurred in St Thomas's Hospital, and both died very speedily after having been attacked, the third occurred in a dragoon regiment in Ireland the fourth was a veterinary surgeon at Clapham both died. Two cases, which he calls *chronic*, extracted from TRAVERS's book "On Constitutional Irritation," one of which died, and the other long suffered from a broken-up constitution. He also refers to the cases mentioned in RUST and OMODEI's Journals. In a subsequent paper he gives "Additional Facts respecting Glanders in the Human Subject," in which he mentions another case that occurred in St Thomas's Hospital, which also died.

I have to thank my friend LAWRENCE for the following observations of the cases of malignant pustule which have come under his care, and which, on account of their rarity, I gladly avail myself of the opportunity to introduce on the present occasions. He says —

"I have had under my care, in St Bartholomew's Hospital, three cases of malignant pustule, in neither of which, however, did I see either pustule or vesicle, of the first and most remarkable, the following is the report from the Lancet of 1825-6, p 127, in which it is described as "A singular case of Erysipelatous Inflammation of the lower Eyelid, terminating in gangrene in the short space of six hours."

John Barker, aged 52 years, currier, stout and robust, came to the Ophthalmic Institution, and, immediately after, in consequence of the nature of his ailment, by Mr LAWRENCE's advice, was sent into St Bartholomew's Hospital

Feb 18, 1826 He stated, that the day before yesterday, whilst at his usual employment, he struck his right eye with a skin of leather, which at the time caused him great pain and uneasiness. At this time there is an erysipelatous inflammation extending around the organ, but more especially on the lower lid and adjacent portion of the check, in the centre of which there is a hard and indurated lump, more prominent than the rest, feeling like carbuncle. It has a very livid hue, and may be said to have gone into a state of gangrene. Since his admission into the hospital, he has not complained of any particular pain in the part, nor is the constitution apparently much affected, the tongue is but slightly loaded, the pulse feeble. Mr

LAWRENCE made an incision through this hard and indurated portion, when a little dark blood escaped. The globe of the eye not in the least affected. Two grains of sulphate of quinine to be taken every six hours, and six ounces of port wine, daily.

Feb 22 The pulse having been quickened last night, the wine has been in consequence discontinued, and a dose of house medicine given this morning

The tumefaction above the lid still continues, and there is now a distinct line of demarcation around the gangrenous spot before alluded to. The whole of the inflamed skin, has a peculiar, hard, brawny feel, very similar to carbuncular inflammation. Mr LAWRENCE stated, that when the man came to the infirmary, there was no unusual vascularity of the eye, a slight serous effusion only had taken place beneath the conjunctiva palpebræ. A slight puffiness is observable about the under lid of the corresponding eye, but there is no redness. Pulse soft and compressible, bowels open and tongue moist. The quinine to be continued, the wine resumed, but omitted at night if necessary.

Feb 25 Has passed a good night and the condition of the parts is improved. The wine and bark, being too stimulating, are both discontinued. A more scarlet or what may be termed phlegmonous inflammation now surrounds the dark gangrenous portion of skin, which is about the size of a half crown in extent, and the contiguous parts have a less brawny feel. Pulse 90, soft, and the patient free from any particular pain. Wears a poultice to the part and takes saline mixture.

March 1 But little constitutional derangement is manifest. The eye examined to-day, but presented no unnatural appearance. Neither of the tarsi are implicated, although the swelling commences immediately below the lower one. To continue as before.

Mr LAWRENCE observed, that BEER only mentions two cases wherein such a sudden change had taken place, and those resulting from the sting of bees, whereas, in the present instance, the mere contact of the leather had produced it. He also remarked that the only author who had mentioned any case like the present was M DELPECH of Montpelier, who has described two or three cases as occurring in butchers and tanners, where the parts went into a state of mortification in the space of a day or two after the occurrence of the accident, although there was no severe contusion of the parts. He ascribes it to some peculiarity in the skin with which they were struck.

March 7 The process of separation goes on favourably, that portion of the slough which is nearest the eyelid has become detached, and is found to extend to some depth. The bowels are kept open by medicine, and a poultice is applied to the part.

March 10 A portion of the slough was removed to-day. For the last two days, as he has had a feeble pulse and complained of great weakness, six ounces of wine, daily, have been allowed.

March 13 The whole of the slough has now been detached, and, as was suspected, the tarsus is quite undermined along its central part, which has caused its dropping, and, consequently, a degree of ectropium. The surface of the sore discharges pretty freely, but has a healthy aspect. Continue as before.

March 16 Every thing to be omitted but the wine.

March 19 The edges of the sore have already considerably approximated, and the granulations have nearly rendered it a mere superficial ulceration. Continue as before. Mr LAWRENCE says, that he shall be obliged, at a future period, to remove the everted portion of the conjunctiva palpebrae.

March 23 The ectropium is lessened, and cicatrization of the sore only now remains to complete the cure. The man was permitted to leave the hospital, and to continue his visits to the Eye Infirmary if he found necessary.

In reference to this case LAWRENCE observes, in his note, "the essential circumstances of this case were a reddened and thickened state of the skin on the cheek, just below the eye-lid, presenting, at the first view, the aspect of incipient erysipelas, speedy mortification of the reddened part, and its slow separation, the mortification including the subjacent textures, so that the cicatrix was fixed to the bone, and the lower lid partially drawn down, absence of constitutional disturbance."

"In the other instances," he continues, "both of which were persons employed in a horsehair manufactory, the skin had sloughed before they came to the hospital. The affected portions were circular, the size of a shilling in one, on the front of the chest, that of a sixpence in the other, on the fore arm. There were no other local symptoms, nor the slightest constitutional disturbance."

TURCHETTI (*a*) has given, under the name of Anthrax, an account of some cases of malignant pustule, which occurred in 1841, after eating diseased flesh of cattle which had died of an epidemic anthrax of the tongue, and had been sold in the market of Fucecchio. In some persons, small, and very painful tubercles, with a red areola, or small whitish pustules, encircled with purple or violet, appeared on the face, lips, neck, or arms, gradually increasing in size until in the space of from one to three days they presented the genuine characters of anthrax. In the greatest number of these cases the slough separated in the course of a week, leaving a more or less healthy ulcer, which cicatrized speedily. In the more severe cases the pustules ran together, the inflammation spread like erysipelas, with extensive livid swelling and obstinate disorder of the alimentary canal. The sloughs did not separate for a fortnight, and left very foul ulcers, which healed with great difficulty. Two elderly persons died of this disease. A young man, eighteen years old, was attacked twenty-eight hours after taking this food with an anthrax on the left upper eye-lid, whence followed mortification of the whole of that side of the face and neck, and part of the chest. At the end of a fortnight the slough cleared off, leaving an enormous ulcer, which suppurred freely and healed slowly.

Dr WAGNER (*b*) relates several cases of malignant pustule produced in man and beasts, both by contact and by eating the flesh of diseased animals, which happened at the village of Striesa in Savony. On the 13th of July, 1834, a herd of cattle having been brought from the pastures to the village, the bull fell to the ground, and was incapable of getting up again. Supposing that it had met with some injury in the loins which would render it useless, it was destroyed by shooting through the head, as happened to be most convenient, and then, having been dressed and cut up by two labourers, the meat was distributed among the villagers. A few days after, some more cattle on the same farm died, and were skinned by the same persons, but the meat was not used as food, as almost all the persons who had eaten of the first beast had felt more or less unwell, mostly, however, complaining only of weight at the pit of the stomach, and pain in the belly, without fever but, several, especially the two persons who had both dressed the animal and also eaten its flesh, complained severely of soreness of the limbs, dizziness and debility. Between the 15th and 18th of the month several more beasts dropped and died without any previous illness. On examining their bodies the spleen was found completely gangrenous and in so broken up a state, that, when cut into, it presented a black paste-like mass, which readily flowed out there were also other inflammatory marks in the belly, and hydatids here and there beneath the skin, especially about the neck. One of the flayers, notwithstanding his uncomfortable feelings, proceeded to a village three leagues off, which he accomplished, but, on attempting to return, was attacked with colic and vomiting, and some hours after was found on the ground suffering severe pain, and passing black blood by stool, his limbs were cold, and soon became attacked with cramp, the whole body like ice, the eyes sunken, and he died vomiting, passing bloody stools, and under great anxiety. One widow woman, of thirty years, who had eaten the flesh, but otherwise not touched the animal, complained of oppression at the heart, and weight of the limbs, had a black pustule on the thigh, felt herself very ill in the evening, went to bed, and early in the morning was found dead. Other persons had pustules on different parts of the body. Two very remarkable cases occurred eight days after any beast had been affected with diseased spleen, both were women, one of twenty-six, and the other of fifty years, and in them the pustules were well marked, and the general symptoms similar to the other cases. The latter patient said she had been bitten by a fly upon the back of the neck, at which part the carbuncle appeared, and the former, that she also had been bitten on the right upper arm, by a gnat. Upon inquiry, WAGNER found that the skin of one of the infected beasts had been hung on a neighbouring wall, and thought it very possible that the insects might have been attracted to them by the smell, and had thence conveyed the poison.

A very interesting paper upon malignant pustule has within the last two years

(*a*) *Sopra alcuni casi di Malattia Carbonchiosa nata per ingestione delle carni di bue perito di glosso-anthrace*, in *Omodei's Annali Universali di Medicina*, vol cui p 276 1842

(*b*) *Uebertragung des Milzbrandgastes auf Menschen und Thiere sowohl durch Berührung, als durch Genuss des Fleisches*, in *HUFELAND's and OSANN's Journal der praktischen Heilkunde*, October, 1834, p 1

been published by Dr BOURGEOIS (*a*) illustrated with numerous cases. He states that the disease appears in from one to three days on the point where the *virus charbonneux* has been deposited, as a little reddish spot almost always of a deep hue, sometimes accompanied with itching, at other times without. It resembles a gnathite, is very ephemeral, and soon followed by a little vesicle slightly puckered, of the same colour, containing a small drop of reddish serosity. Sometimes, instead of this mark, the vesicle is preceded by a solid pimple as big as a pin's head, more or less brown and rosy in some cases. The vesicle thus formed is accompanied with a sensation of great itching, and sometimes shivering, but is rarely painful. The patient scratches off the vesicle with his nail, and the itching generally ceases for a few hours, after which, around the scratched pimple, which is dry and yellowish, a regular circle of vesicles, similar to the first, but larger, are formed. In the centre of the circle, now only a few millimetres in diameter, a little brownish depression, deprived of its cuticle, and formed by the skin, on which rests the primitive ampulla, mortified, and forming a dry and very hard scar, and including the whole thickness of the skin. This continues enlarging, and fresh vesicles are formed around its margin. In from twenty-four to forty-eight hours the flesh on which the pustule rests swells, hardens, and forms a tumour more or less sensible, rarely deficient, and generally roundish, but sometimes oval, and of variable size, this he calls the *tumeur charbonneuse*, on the top of which, but rarely occupying its whole extent, is the pustule. That part not covered with vesicles is of a livid red, and spreading more or less on the neighbouring tegument. The middle part of the tumour is especially depressed, but the whole limb, head, trunk, or several of these parts, may simultaneously acquire an enormous size. As the pustule continues increasing, the redness spreads farther, and fresh vesicles are developed. At this time the parts, if touched, have, in many cases, a hardness equal to that of a schirrous breast, but gradually soften at a greater distance from the centre, become tremulous, and even œdematosus. But BOURGEOIS says he has never noticed the emphysema mentioned by authors, and copied by one writer from another. The heat of the diseased part, at first very great, by degrees diminishes, till it becomes quite cold. On the limbs red tracks of inflamed superficial absorbents are constantly noticed.

Before the parts in the neighbourhood of the tumour swell, there is most generally constitutional impregnation, the patient has lassitude, headache, the tongue is covered with a whitish coat more or less thick, the appetite diminishes, the pulse is full, rather frequent and soft. More rarely these symptoms do not appear till the disease is accompanied with considerable swelling.

If the disease be not arrested, the swelling extends more and more, the parts become enormously swollen, the phlyctænae increase in number, and the scar in size, with scarcely any pain, but there is only weight and numbness of the affected parts. The general symptoms, however, become more formidable, the pulse small, quick, narrow, depressible and irregular, frequent vomiting of yellow or greenish bilious matter, violent thirst, faintings, singing in the ears, somnolence, urine scanty, red and brick-dusty, difficult motions, but at other times, and, very rarely, very fetid purging, the skin, at first hot and perspiring, becomes covered with cold clammy sweat, respiration more or less difficult, in the greater number of cases the intelligence remains undisturbed, but in some there is violent delirium. Subsequently the pulse ceases at the wrist, the body is covered with a cold sweat, the voice quenched, the skin becomes bluish, there is a sensation of burning heat within the body; unquenchable thirst, threatening suffocation, the patient cannot sit up, no urine, extreme anxiety, and finally death puts an end to this frightful condition, generally without pain.

BOURGEOIS says, that he has never observed the dull delirium mentioned in books, and that, with the exception of one case in which the patient had evidently an affection of the brain, all he saw were sensible to the last. Nor has he ever seen the enormous eschars attacking all the soft parts of a limb or spreading to a great extent, as mentioned by writers in general.

Authors have usually divided the disease into four stages, without including that of the incubation of the disease. These, however, BOURGEOIS considers arbitrary, and thinks that there are only two distinct periods in the course of malignant pustule,

(a) Mémoire sur la Pustule Maligne, spécialement sur celle qu'on observe dans la Beauce, in Archives Générales de Médecine, &c., Fourth Series, vol 1 pp 172, 334 1843

the first commences with the appearance of the primitive malignant spot, which he calls the *local period* or *first period*. The second, which he designates under the name of the *period of impregnation* or *intoxication*, commences with the first general symptoms and terminates only with death or cure." The course of the disease is very variable, it may terminate in two or three days or extend to the fourteenth. The first period is generally the shortest, but he has noticed it running on to the fifth day, the second varies from thirty-six hours to eight or nine days.]

For the Literature of Malignant Pustule, see p 112

35 Hospital Gangrene (*Gangrēna nosocomialis*, Lat., *Hospitalbrand*, Germ., *Powurture d'hôpital*, Fr.) consists of a peculiar decomposition of organic parts appearing under manifold forms. A wound or sore begins to be painful, the edges inflame, the suppuration becomes less and of a serous character. Some days after, on certain parts, or on the whole extent of the wound, appears a whitish, thin, semi-transparent membrane pretty firmly connected with its surface, which increases in thickness and extent, and gives the whole surface a grayish-white appearance. This mass cannot be removed, and, if it be attempted, only a part of the whole which is firmly connected with the wound, can be removed. The wound increases in all directions, the edges become still more painful, œdematosus, and the œdema spreads. Sometimes hospital gangrene commences also with painfulness of the suppurating surface, but upon it are observed more or less deep cavities, the edges of which are dusky red, and covered with yellowish, white, consistent pus. These ulcerous spots increase and run together, a bloody ichorous fluid is secreted, and the surface of the sore increases in all directions. Lines of inflamed lymphatic vessels commonly stretch to the neighbouring glands. The destruction is often restricted to the cellular tissue, but, in more decided cases, the muscles and all parts without distinction are destroyed. Bleeding often occurs from the destroyed vessels. The bones resist for a long while, but finally give way.

With these local appearances there is always loss of appetite, pain in the region of the stomach, disposition to vomit, costiveness, loss of sleep, a quick and rather weak than strong pulse, hot skin, great anxiety, and restlessness. In the more severe form of the disease all the symptoms of typhus fever come on. These general symptoms often precede the local. The severity and course of this disease as well as its continuance vary in different persons. If it be long continued or often recur, hectic fever and exhausting purging at last set in.

In some cases the hospital gangrene arises in form of a little inflamed pimple or vesicle, without any preceding injury to the part being perceptible (a). Hospital gangrene is quite different from the scrofulous complication of sores and wounds.

[Liston (b) gives the following brief account of hospital gangrene, as it appeared in University College Hospital, in the year 1841. The case he mentions followed the removal of some metacarpal bones and fingers. "All at once, the stump, which had been healing kindly, assumed a carious appearance, it became enormously swollen within a few hours, and profuse haemorrhage took place, which there was considerable difficulty in stopping. This might have been, and was sure enough by some who saw it, taken for malignant disease, but it was exactly like what I had seen before in unhealthy seasons, and in badly-regulated hospitals. The season was a very severe one, there had been a great snow-storm, with very cold weather of

(a) THOMSON, as above, p 460

(b) Lectures on the Operations of Surgery, &c., in Lancet (New Series), vol 1, p 57,

long duration. Not many days passed over before a number of wounds assumed the same appearance, the parts got puffy round about them, the discharge became slimy and tenacious, very putrid, and bloody fetid gas filled the cellular tissue around them. They extended rapidly, presenting a circular form. Many patients lost a considerable quantity of blood, in fact, we were visited by a rather rare disease, hospital gangrene, one which I trust I may never see again. Luckily, out of a good many patients who were so attacked, and in all parts of the hospital almost simultaneously, not one perished. Many of the wounds and ulcers were frightfully extended, but they speedily got clean, and healed soon afterwards very kindly. * * * After the separation of the sloughs, a *circular* clean granulating surface was left. We were at a loss to account for this invasion there was nothing as regarded the hospital, its ventilation, or drainage, or management, the dressing of sores, &c., that could be blamed. The disease came upon us suddenly, and as suddenly disappeared, and I need not tell you that we have seen nothing of the kind since."

My friend ARNOTT informs me that in January, 1835, in one of the female wards of Middlesex Hospital, three cases occurred which might be classed under the head of hospital gangrene, of which the following is a short account —

CASE 1 —The disease attacked a common ulcer of the leg, the surface became black and pulpy, with a broad very red margin of integument, a raised edge, and great pain. From the size of half-a-crown, the disease extended and occupied, ere it was stopped, a space of a large wash-hand saucer, exposing the muscles and bone. It was arrested by the application of pure nitric acid, and the removal of the patient into another ward.

CASE 2 —The disease appeared on an ulcer by the side of the anus, presented the same character, but was arrested by balsam of Peru, locally, and a grain of opium every six hours, internally. The disease recurred, and the patient was removed from the hospital.

CASE 3 —A punctured wound of the chest did not heal, but that of the integument enlarged by the conversion of the tissue into a grayish pulpy substance, (not black, and without the fiery margin and intense pain of the other cases,) more like phagedæna. It was stopped by balsam of Peru. "I have never seen," he says, "a similar case in the Middlesex Hospital before or since."

I have mentioned the above cases of hospital gangrene, because they are, as far as I can ascertain, the only instances of the disease which have been seen in either of the London hospitals for many years. Cases occurred many years since in the old Westminster Hospital, and also in the York Hospital at Chelsea, which latter being a military establishment, the disease was believed to have been brought home by the sick and wounded soldiers from abroad. With these exceptions, I have the best grounds for stating that in no other hospital in London has it existed in the memory of either of the present surgeons, so that it is a disease entirely unknown to them, excepting to the few who have seen it elsewhere.

LAWRENCE (a), speaking of sloughing phagedæna, observes "that these occurrences generally take place in women of the town under the particular circumstances I have now stated, but it is by no means exclusively confined to cases in which the origin might be supposed to be *venereal*. I remember a very bad instance in this (St Bartholomew's) hospital, in a case that was under the care of Dr LATHAM, by whom I was requested to see it on account of the sloughing phagedæna. It was a young woman who had had the small-pox very badly. The disease had rendered her very weak, and diarrhoea came on. There was a considerable discharge from the vagina, and a constant moisture of the parts by a discharge from the rectum. Thus the skin of the nates became highly inflamed, and in fact a large excavation of sloughing phagedæna formed on each buttock and she was reduced to a very low state by the disease. Dr LATHAM asked me what I thought could be done, and, having examined her, I thought badly of the case, but that we might destroy the excavations in her buttocks, which were nearly as large as a good sized teacup, and possessing all the characters that I have mentioned. They were treated by nitric acid applied with lint wrapped round the end of a probe till the sore was saturated with it, and a brown eschar produced, the surrounding parts having been previously well dried, to prevent the spreading of the acid beyond the sore. Port wine was liberally allowed her, and she got well. This was a cause of a common kind in

(a) Lectures, as above

which you could not ascribe the effect to syphilitic disease. Now, as far as I can understand the affection called *hospital gangrene*, it is the same as the sloughing phagedæna I have now described" (p 454) I think there is little doubt that this was a case of hospital gangrene, and not of the so-called sloughing phagedæna. But it is difficult to make out whether LAWRENCE holds them as distinct or as the same disease, though probably the former, as, in speaking of "the treatment" of hospital gangrene, specially, he says, it, "in other respects, is the same as I have mentioned for sloughing phagedæna" (p 455)

I cannot agree with SAMUEL COOPER, that the sloughing phagedæna, of which an account, founded on the cases to which LAWRENCE refers in his Lectures, is given by WELBANK (*a*), "certainly resembles hospital gangrene," as described in books. The sloughing phagedæna was certainly an endemic supervening on venereal excoriations or sores, and *not* hospital gangrene I shall advert to it hereafter, in speaking of chancre, or venereal ulcers

The only cases that I have seen, with the slightest resemblance to hospital gangrene, were the sloughy stumps now and then occurring, perhaps more frequently during those years, formerly, when our wards were much troubled with erysipelas. The operation would either seem to be going on favourably for two or three days, the patient comfortable, and adhesion in progress, when a sudden change would set in, the stump become painful, swollen, hard, and red, the un-united part become sloughy, and the united part falling asunder, and soon also becoming sloughy, or, the stump never making any attempt at union, but soon becoming painful, swollen, and sloughy. In either case, the patient himself hot, dry, flushed, with brown tongue, and foul alvine discharges, the pulse quick, irritable, delirium and death supervening. I said such cases occurred, perhaps, more frequently when erysipelas was rife, but they really do happen when no erysipelas is in the ward at the time, nor has been for many months, and they occur not unfrequently in primary amputations in stout persons who have been accustomed to large quantities of beer or spirits, or of both, and from which they are not unfrequently entirely at once (and, as I consider, improperly) debarred, and hence, with a greater call than usual upon the powers of the constitution, are left to meet it with diminished means. Such cases are to be considered merely as resulting from want of power, but they are never epidemic or contagious, and must not be confounded with, hospital gangrene, which however frequent it may be elsewhere, is, in London, at the present time, and has been for years, unknown by personal experience to most hospital surgeons — J F S]

36 The characteristic of hospital gangrene is its quick extension and the decomposition of the tissues without any special residue, if the grayish-white mass in certain cases be not so considered. Hospital gangrene is an extension of a wound or of a sore intermediate between ulceration and mortification

37 The cause of hospital gangrene is the operation of a peculiar contagious matter, either upon wounds and the ulcerated parts or upon the whole body. The contagion develops itself usually in hospitals, where the air is deteriorated, many patients huddled together, and the bandages not kept clean, specially in unhealthy places, as jails and so on. We know not how long the contagious matter may retain its activity. Probably the constitution of the atmosphere, the weather and climate influence the development and character of hospital gangrene. The susceptibility to contagion is not diminished by its having once been acted upon, on the contrary, it seems to have increased. The contact of the contagious matter with the wound is either the consequence of want of care in dressing it, its long exposure to the action of the air infected with contagion, or its having been covered with bandages in which the poison is retained. The contagion may happen to every person, and in every kind of wound and ulcer it rarely, however, alters specific ulcers,

whilst, on the contrary, a bilious constitution, mental affections, great feebleness, typhus fever, appear to be most favourable to it. The character of the disease itself may be changed by the constitution of the patient, and by the state of the weather, it may even become inflammatory, in which case the wound is encircled with a red ring, the pain is severe and throbbing, the pulse quick and hard, and the bleeding which occurs produces relief. Hospital gangrene is always a very dangerous complication of wounds and sores. Accidental circumstances may render the danger still greater, for instance, if it be impossible to give the patient attacked with the disease better and better nursing, and so on. Left alone, hospital gangrene is usually fatal. If it have proceeded to a certain extent, art is rarely of any avail.

For the Literature of Hospital Gangrene, see p. 114.

38 After the appearances and terminations of inflammation, which have been described in general terms, we now come to those variations which inflammation may offer to our notice.

The existence of inflammation depends always on unnaturally raised vital processes manifold circumstances, however, may change the appearances and course of inflammation, and these changes are only to be considered as modifications of simple inflammation and the more so, the less they correspond to what we understand by increased vital action. The inflammation may be classed, 1st, *according to its appearances and course*, 2d, *according to its causes*, 3d, *according to the structure of the parts attached*.

39 If the inflammation make its appearance with a certain intensity of its symptoms, and proceed rapidly, it is called *acute*, but, contrariwise, *chronic*, when the intensity of the symptoms is slight and their duration protracted, which condition may be either primitive or consecutive, depending on the constitutional condition. In regard to its character, inflammation is farther divided into *simple*, *erethitic*, *torpid*, *malignant*, and *obscure*. In *simple inflammation* all the symptoms of inflammation are present in a corresponding degree, it runs a speedy and most commonly satisfactory course, it is almost peculiar to strong persons, who have good health, its termination, if not resolution, is generally suppuration. The *erethitic* and *torpid* character of inflammation are merely modifications according to the *constitution of the patient* and the *degree of the inflammation*. In the *erethitic inflammation* the symptoms have not the same degree of severity as in simple inflammation, the sensibility is, however, distinctly increased, and it therefore especially appears in persons of delicate constitution. The *torpid inflammation* has a remarkably tedious course, and its symptoms seem to depend rather upon a local obstruction of the circulation in the capillary-vascular system than upon an accelerated vital activity, all the signs of active congestion are wanting, the part is not bright red, but dusky and brownish. It occurs specially in weak, reduced, cachectic subjects. Simple inflammation may also, under improper treatment, assume a torpid character. *Malignant inflammation* (*Inflammatio maligna, gangrenosa*) is often painless, or accompanied by an obtuse, heavy pain and dusky redness. Its cause is sometimes manifest as the effect of deleterious or contagious matter, at other times, it is unknown. It supervenes on typhus and pu-

trid fevers, and usually runs into gangrene *Obscure inflammation* (*Inflammatio occulta, clandestina*) is that which is little or not at all indicated by symptoms

40 Inflammation is divided, according to its different causes, into *idiopathic, symptomatic, specific, and sympathetic*. *Idiopathic inflammation* is the consequence of external violence, it exists as a local disease, and its severity is regulated by the degree of the injury and the condition of the subject. *Symptomatic inflammation*, at least the definite form under which it first appears, depends on internal causes, and the inflammation itself is to be considered only as a reflection of the general disease. If this be of a specific nature, as syphilis and so on, the inflammation is said to be *specific*. *Sympathetic inflammation* is the consequence of a consensual change in the mutual relations which one part holds to another by which their diseased affections become shared by both. The *metastatic inflammation* which passes from one organ to another is in close connexion with the sympathetic.

Symptomatic inflammation is either the original symptom of general disease, or an originally *idiopathic* inflammation acquires, through the general disease, a definite character.

41 In whatever part inflammation may occur, its peculiar seat is always in the *capillary-vascular* system. But its symptoms vary according to the different conditions of the affected part.

Inflammation of the *Skin*, if not severe, terminates in resolution with scaling of the cuticle, and not unfrequently also with dropsical swelling. In a more active inflammation a fluid is poured out beneath the cuticle, producing vesications and pustules. If the inflammation be tedious without being active, the cuticle is destroyed, the fluid poured out by the exposed vascular net thickens into crusts. If the inflammation extend to the subjacent cellular tissue, it is generally severe and runs into suppuration.

Inflammation of the *Cellular tissue* is usually accompanied with much ill-defined redness, with firm elastic swelling, much tension and throbbing pain, it does not resolve except it be in a mild form, its usual termination is suppuration, not unfrequently gangrenous destruction of the cellular tissue.

[This important affection of the cellular tissue, which has only within the last twenty years been particularly noticed, though commonly spoken of under the common title of erysipelas, is described more at length by our author, at page 103, "as a metastatic deposit in the cellular tissue, and one of the causes of his *Erythema symptomaticum seu consensuale*". Doubtless, it may be, and occasionally is, metastatic, but, generally it is idiopathic. It has of late years become common, and is a very rapid and dangerous disease, unless early and properly treated. Its importance is so great, that it is as fully entitled to a proper chapter as erysipelas, from which it most decidedly differs. But it will be, perhaps, more convenient to insert what I have to add where the subject comes under consideration in our author's arrangement, rather than to remove and drag his paragraphs into places for which he had not intended them, under pretence of making his meaning more clear, as if the author did not best understand his own view of the subject he discusses, a proceeding which has been occasionally practised in English translations, which I think cannot be too much deprecated, and the least inconvenience of which is, that it is not unfrequently impossible to refer from the original to the translation, or from the translation to the original.—J F S.]

Inflammation of the *Glands* mostly exhibits not very acute but rather

dull pain, no great heat, very solid circumscribed swelling, which also extends itself into the surrounding parts. Its termination is similar to that of inflammation in the cellular tissue, except that glandular inflammation most commonly assumes a chronic character, and then easily passes into hardening.

In inflammation of the *Mucous Membranes*, their secretion is stopped at the onset, at the same time, increased warmth and sensibility, heavy pain and great redness make their appearance, a secretion of thin somewhat acrid fluid, the thickness of which increases, becomes creamy, and of perfectly mild character. No tissue so readily as the mucous membrane acquires a morbid disposition to inflammation. When affected with long-continued inflammation their spongy cellular tissue becomes loosened, swelled, thickened, and the vegetation on it often is so changed that new formations, polypous excrescences, are developed. In active inflammation, or in long-continued flow of mucus, ulceration and destruction of the underlying parts frequently occur. Very rarely do inflamed mucous membranes become adherent.

[In reference to the kind of inflammation which occurs in mucous membranes, HUNTER says — “In internal canals, (I make a difference between an internal cavity and a canal, they are very different in their construction, their uses, and also their mode of action in disease are very different,) where adhesions in most cases would prove hurtful, the parts run immediately into the suppurative inflammation, the adhesive inflammation in common being excluded, such parts are the internal surface of the eyelids, nose, mouth, trachea, air-cells of the lungs, esophagus, stomach, intestines, pelvis of the kidneys, ureters, bladder, urethra, uterus, vagina, and indeed all the ducts and outlets of the organs of secretion, which all these parts mentioned may be in some degree reckoned, and which are commonly called mucous membranes. In such parts, if the inflammation is but slight, the suppurative in common takes place, which is almost immediate, as it is not retarded by the adhesive stage, which accounts for the quickness of suppuration of these parts in many cases * * *. Since those surfaces are, in general, secreting surfaces, suppuration would appear to be only a change in the secretion, and I think I have visibly seen, or could visibly trace, the one change gradually leading into the other, the different parts, therefore, of which the pus is composed, will not always be in the same proportion, so that the matter will seem to vary from true matter towards that of the common secretion of the part, and *vice versa*, but this does not alter the position, for it is common to matter from a sore, and even common to our ordinary secretions. If this inflammation which produced suppuration on these surfaces becomes more violent, or has something of the erysipelatous disposition, we find that it moves from the suppurative to the adhesive, and throws out the coagulating lymph” (p 241 2)]

The *Serous Membranes* have great disposition to inflame, the inflammation is very painful, usually appears suddenly, spreads quickly, and easily passes into resolution, adhesion, transudation, and mortification, but rarely into ulceration. Serous membranes often thicken, either by the cellular tissue upon their external surface or by plastic membranes, or even in their own proper substance. Chronic inflammation of serous membranes appears mostly in the form of dropsical affections.

[Serous membranes are the circumscribed cavities which, with “the cellular membrane or the body in general,” belong to the first order of parts into which the body is divided by HUNTER, and in relation to which he observes — “When inflammation takes place in the first order of parts, it is commonly the adhesive, but it will be according to circumstances whether the suppurative or the ulcerative follows first” (p 253) “The adhesive inflammation serves as a check to the suppurative, by making parts which otherwise must infallibly fall into that state, previously unite, in order to prevent its access, as was described in the adhesive inflammation being limited, and, where it cannot produce this effect so as altogether to

hinder the suppurative inflammation itself from taking place, it becomes, in most cases, a check upon the extent of it" (p 365,) of which inflammations of the pleura, or surface of the lungs, presents a good example, "the adhesive inflammation takes place, and the surfaces are united, which union going before the suppurative confines it to certain limits, so that distinct abscesses are formed in this union of the parts; and the whole cavity of the thorax is not involved in a general suppuration" (p 366)

The peculiar disposition of serous membranes to assume in preference adhesive inflammation is remarkably contrasted with the equally special preference of mucous membranes for the suppurative inflammation. The construction of closed cavities by the serous, and of canals by the mucous membranes, afford the ready explanation of these peculiarities. Any opening, therefore, in a serous membrane puts it in an unnatural condition, and, consequently, if it were attacked with suppurative inflammation, the pus produced requiring an aperture for its escape, such unnatural state would be induced, and the functions of the membrane interfered with or destroyed. Therefore, most commonly, adhesive is the kind of inflammation occurring, which only diminishes the cavity (the lesser evil) without opening it, and when, more rarely, suppurative inflammation ensues, it is most usually shut off from the general cavity by adhesive inflammation, as in spurious empyema, and only in few cases existing without such adhesion. Whilst, on the contrary, were mucous canals attacked with adhesive inflammation, they would be at once blocked up and the most dangerous consequences ensue, as occasionally observed in croup, and so on, but they prefer suppurative inflammation, and no such danger accrues — J F S

The inflammation of serous membranes sometimes runs on to suppuration. This was noticed by HUNTER, who observes — "In spontaneous suppurations, one, two, three, or more parts of the inflammation lose the power of resolution, and assume exactly the same disposition with those of an exposed surface, or a surface in contact with an extraneous body. If it is in the cellular membrane that this disposition takes place, or in the investing membranes of circumscripted cavities, their vessels now begin to alter their disposition and mode of action, and continue changing till they gradually form themselves to that state which fits them to form pus * * *. From hence it must appear that suppuration takes place upon those surfaces without a breach of solids or dissolution of parts, a circumstance not commonly allowed, and, when got beyond the adhesive state, they become similar in their suppuration to the inner surfaces of internal canals" (p 378.)]

In inflammation of the *Fibrous Tissues* the pain is sometimes very severe, sometimes changeable, deep-seated, increased less by pressure than by the motions of the part, the warmth is much increased, the swelling, according to the difference in structure of the neighbouring parts, sometimes hard, sometimes soft, the redness slight, often scarcely discernible, but often far outspread. Its terminations are resolution, metathesis, gouty concretions, gangrene, and suppuration, which is confined to the cellular tissue connecting the fibres together, whereby a laminated arrangement is produced.

Inflammation of the coats of *Arteries* (1) is either generally diffused, with violent pulsation of the heart and arteries and high fever, or it is confined to one spot, when the symptoms are commonly obscure. The acute *partial* inflammation of arteries commonly runs into adhesion, the *chronic*, which mostly depends on diseases with little power, into thickening, loosening, ulceration, deposition of calcareous masses, whence (2) commonly results the origin of aneurisms.

[(1) Arteritis, as it is now generally called, is, probably, if idiopathic, an inflammation of the internal only, and not of all the coats of an artery, but, if traumatic, arising either from wound, from ligature, or more extensive pressure and the like, or if the inflammation have been communicated to the artery from neighbouring diseased parts then all the coats of the vessel become affected, and may pass through the various forms of inflammation. "The active and violent pulsations," says

BOUILLAUD (*a*), which the arteries in the neighbourhood of a very acute whitlow perform are the type of those which characterize general arterial irritation. And he also observes, that there is besides the increased force of the arterial pulsations, a sensation of heat and uneasiness in the region which the inflamed artery occupies" (p 411.)

Redness, thickening and friability are the appearances described as presented by the internal coat of an artery under acute inflammation, the redness and thickening from swelling of the membrane occurring simultaneously.

HODGSON (*b*) describes four cases, in the first of which the internal coat of the aorta was of deep red colour, a great effusion of lymph had taken place into its cavity, and become very intimately connected with the internal coat, and a plug of the lymph extending into the left subclavian artery nearly obliterated its cavity; these appearances accompanied a violent pneumonia. In three cases, viz of carditis, pneumonia and bronchitis, he also saw it, but the effusion of lymph was less, in one case the aorta was throughout of a deep scarlet colour, and a little above the semilunar valves the coats of the aorta were distended with lymph (p 5.) He also quotes from PORTAL (*c*) a case of sudden subsidence of measles, in which "the aorta was throughout nearly its whole extent very red, and its walls swollen and soft, especially in the thoracic region, near the diaphragm, where it was covered with varicose vessels, the internal coat was swollen and softened" (p 127.)

Redness, however, is not always present in an inflamed artery, and it often exists when there is not any inflammation, when putrefaction has commenced, in consequence of the blood transuding. And BOUILLAUD says—"It is right to observe, that the redness of the internal membrane of arteries, even in the case where one is disposed to refer it to acute arteritis, is not produced, at least in the great majority of cases, by capillary injection, but rather by a kind of tinting or fixation of the colouring matter of the blood on the internal membrane. Under this new point of view the inflammatory redness differs not essentially from that which is called *cadaveric*" (p 403.) In inflammation of the whole thickness of the arterial walls, the outer coat is generally red, in consequence of the active and free injection of the numerous vessels which every where penetrate them, and sometimes there is even a slight infiltration of blood. BOUILLAUD farther observes, that "after the internal coat, or even all the coats of an artery has been some time inflamed, it is easily detached in large flakes, the subjacent cellular tissue becoming friable". I apprehend, however, that what he considers as flakes of the internal coat are really deposits of adhesive matter upon the coat, and not portions of the coat itself. The result of acute arteritis is then deposit of adhesive matter, and, as already mentioned in one of HODGSON's cases, sometimes sufficient to fill up the tube of the artery, though, from the friction of the stream of blood upon the deposited lymph, BOUILLAUD considers that it is drawn into the stream, and that rather the "inflammation determines the coagulation of the blood circulating in the artery, and thus is easily explained how the secreted matter, in addition to the mass of coagulum, may produce arterial obliteration" (p 407.)

Adhesion of the lining membrane, and obliteration of the arterial tube, is one of the results of arteritis, but, as will be presently shown, the effusion of adhesive matter, and even the coagulation of the blood in the inflamed vessel, do not always cause mortification of the limb, as DUPUY TREN would seem to consider, that condition depending rather on the number of the vessels affected with inflammation, and the quickness with which the adhesive deposit takes place, so that the supply of blood is cut off before the collateral circulation can come into play. The usual consequences of inflamed artery are seen in the application of a ligature upon an artery, in which case generally the collateral circulation is speedily established and no inconvenience to the limb is sustained, whilst, on the other hand, occasionally the circulation is restored so slowly that mortification to greater or less extent ensues.

The following case of partial arteritis came under my own care, and for its previous history I am indebted to my intelligent friend CRISP of Walworth, whose patient he was.

Thomas Batt, aged 21½ years, a grocer's assistant, about five years prior to the

(a) Dictionnaire de Médecine et de Chirurgie Pratiques, vol III Article *Arterite*

(b) On the Diseases of Arteries and Veins, &c., London, 1815, 8vo

(c) Anatomie Médicale, vol III Paris, 1803 8vo

present time, (August, 1843,) had an attack of rheumatic fever which lasted six or seven weeks, and since has had several slight attacks of pleuritis, for one of which he was bled, but neither were so severe as to confine him to bed. The bellows sound was always heard over the region of the heart. On the 7th of August he was seen on account of slight pain in the chest, for which he was ordered some aperient medicine with *vin antim. potass tart.* The pulse at the left wrist was then felt, and nothing remarkable observed.

August 9, A M Whilst putting on his waistcoat, he was struck with pain like the prick of a pin, about the middle of the left upper arm, and in the track of the brachial artery, which continued for about an hour, and during that time his arm "became dull and cold as low as the elbow." He saw his medical attendant at 10 A M, the arm and hand were then cold, and no pulsation could be felt below the arm-pit, at which part the artery was felt beating, but not forcibly, (90 a minute,) and over it great tenderness on pressure. The pulse of the right wrist was 100, and rather more powerful than usual. The ailing arm was ordered to be put in warm water for a quarter of an hour.

4½ P M In the same state as the morning, but has had five or six times a sensation of throbbing in the arm, with tingling and numbness of the fingers.

10 P M As he continued much the same, six leeches were applied to the arm-pit, and an opening draught given immediately.

August 10, A M Caustic was applied to the leech-bites, which had bled all night and were still bleeding, so that he felt rather faint from loss of blood, but the pulse of the right arm is not much affected. No pulsation in the left wrist, but the hand less cold than yesterday. There is great tenderness over the commencement of the brachial artery. *R pulv. colchic, pulv antim, aa gr v hydr c creta, gr. & quintis horis sum.*

August 11 Much the same the artery painful on pressure, the powders continued.

August 13 No change since the last report, except that the tenderness over the brachial artery is less and the hand not so cold. His bowels being confined, an aperient draught was ordered immediately, and the powders continued.

August 15 He came under my care at St Thomas's, and, in addition to what has been already mentioned, he says, that he has long had a sense of weakness as if overworked, and that during the first day of the attack, the dulness and coldness continued extending down to the wrist, but unaccompanied with pain, that for the last two nights his arm has been affected with dull aching pain which has prevented his getting rest, but has subsided during the day. At present he is free from pain, except when the arm is bent or hanging down, under either of which conditions he has pain at the original spot in the middle of the arm. He has much tenderness on slight pressure from the middle of the arm upwards, and the arm-pit in the course of the artery, but none below. The pulsation in the brachial artery below the specially indicated part, is scarcely, if at all perceptible, and above it is slight at the wrist, in the ulnary artery, there is not any pulsation, but the radial artery pulsates slightly. The pulse of the right wrist is distinct, full and quick. I ordered bleeding from the right arm to twelve ounces, milk diet, and *hg ant potass tart m ex mist potass citr 4ts*

August 16 He has been relieved by the bleeding, has less pain and more feeling in the arm.

August 17 A careful examination by the stethoscope indicates regurgitation through the aortic valves.

August 22 Complains of having had occasional shooting pain in the fore and middle fingers of the left hand, as if being cut off. No increase of pulsation at the wrist, the upper arm is less tender. He complains of having had pain in the sole of the left foot two days since, which yesterday extended into the great and second toe, so that he could not bend them without much pain, in course of the day the pain subsided at this part and attacked the dorsum pedis, where it yet remains, though less severe than yesterday.

September 5 Pulsation in the left radial artery is now very distinct, though small.

September 26 On examination with the stethoscope, distinct bellows murmur with the second sound most decidedly over the aortic valves, and the first loud, short and clear pulse jerking, regurgitation through the aortic valves, and dilatation of the heart.

October 4 The pulsation at the wrist still continues steady He complains of having cough with expectoration and want of rest at night, is languid and thin, and his health not improving *R. pil opii gr 1 o. n.*, which was on

October 24 Replaced with *tinct camphr comp 3j ex mist amygd ter in die*, and, on

October 27 The opium was resumed He has been gradually becoming more languid without any very distinct cause

November 3 He spat a little blood, which continued increasing by degrees till

November 5 When he spat a large quantity, and died in the evening During the last three days he has been so much exhausted, that it was absolutely necessary to keep him up with arrow-root and port wine four ounces daily

EXAMINATION—Chest Some old pleuritic bands on the left side, but none on the right, the left pleural-cavity containing a considerable quantity of serum

Pericardium universally adherent, its free portion separated from the visceal with great difficulty Heart enlarged, its apex wide and rounded both ventricles enlarged, the walls of the left thickened, and those of the right somewhat thinned. Valves on the right side perfectly healthy On the left the sigmoid valve of the aorta thickly beset or fringed with vegetations The curtains of the mitral valve thickened and containing points of cartilage and bone Both aortic and mitral orifices contracted, mainly dependent on the thickening of their individual valves

Belly Liver rather enlarged, dark-coloured, and in a state of hepatic venous congestion

Left Arm Brachial artery high upon the arm over a space of from half-an-inch to an inch, of a red colour, and its coats thickened, containing at this point a plug of coagulable lymph adherent on one side to the lining of the vessel Below this part the vessel was much constricted to the extent of three or four inches, beyond which it again resumed its original calibre, and there the orifices of three or four minute vessels were perceived

Adhesive matter may be deposited between the internal and middle coats of an artery, and even pus, of which an instance is mentioned by ANDRAL The internal coat of the aorta "was elevated by half-a-dozen little abscesses, each about the size of a hazel-nut and situated between it and the middle coat, the pus contained in these abscesses resembled the usual pus of phlegmon" (p 379)

(2) The deposit of earthy matter in arteries generally involves only their coats, especially the inner coat, upon the exterior of which the earth is held to be deposited, in consequence of the thin internal coat being usually traceable and separable from it, so that the earth is not in immediate contact with the stream of blood This, however, is not always the case, for the lining coat sometimes appears to be deficient, or hangs in shreds into the tube of the artery, so that the blood does actually flow in contact with the earthy matter, and the latter is occasionally deposited in such quantities that it completely fills up the cavity of the artery, rendering it impervious, and converting it as it were into a calcareous rod, the particles of which, however, are not in very intimate union an excellent instance of such conversion of the femoral artery is in the Museum of St Thomas's Hospital

The deposition of calcareous matter in the coats of arteries is not restricted to old persons, for PORTAL observes—"The vessels of young persons rarely ossify instances, however, have been noticed of ossifications in the arteries of some children in whom the ossification of the bones had not proceeded far" (p 133). HODGSON also mentions, that "George Young possesses a temporal artery, which he removed from an infant of fifteen months old, in which the coats of the vessel are converted into a complete tube of calcareous matter" (p 23)

The analysis of the earthy concretions made by BRANDE for HODGSON presented 65 5 of phosphate of lime, and 34 5 of animal matter in 100 parts, the latter consisted chiefly of albumen, with traces only of gelatin No carbonate of lime was discoverable — J F S

These earthy deposits are not bone, as appears from the following statement of MIRSKIN (a) —"Ossifications of all the arteries very frequently occur which are situated between the innermost and proper tunic, in form of larger and smaller plates, of which the smooth surface turned towards the cavity of the artery, the colour, density and toughness very closely resemble true bone, but, when broken, they

(a) De Inflammatione Ossium eorumque Anatome generali Berolini, 1836 4to

always had to me a foliaceous or squamous appearance, very like the scales of an oyster-shell, nor could I ever, though often seeking with the microscope, discover corpuscles or canalicules, the soft substance left after the addition of hydrochloric acid never presented any definite texture " (p. 46)]

Inflammation of the *Veins*, when partial, manifests itself by the symptoms of inflammation in general, but, when it spreads farther and attacks the large venous trunks, then appear violent symptoms, such as a rapid pulse, depression, restlessness, delirium, and so on. The cause of inflammation of the veins is most commonly external injury. Its terminations are, 1st, thickening of the venous coats, 2d, stagnation and formation of clots, 3d, effusion of plastic lymph and obliteration, 4th, formation of pulsating swelling, 5th, suppuration and bursting of the venous walls, and, 6th, ossification.

According to CRUVELHIER (*a*), the symptoms in adhesive phlebitis, as well as in circumscribed suppurative phlebitis, are entirely local, and originate in irritation of the internal coat of the vein, and in the mechanical obstruction, which, by stopping up the veins or the branches of the inflamed venous twigs, opposes the passage of the blood and of the lymph. The pain and fever depend on the inflammation, and the œdema upon the mechanical obstruction to the circulation. In the uncircumscribed suppurative phlebitis, the symptoms depend on infection of the blood. The patient passes suddenly and without intermission from a state not seemingly dangerous to stupor, prostration of power, and to death, like an animal into whose veins pus has been injected.

[Inflammation of the veins or phlebitis, as it is now generally called, is far from an infrequent disease, and when very active is extremely dangerous. As our author states, the cause of this disease is most commonly external injury, but I have known it to arise spontaneously in the leg, where the veins have had a varicose disposition. The track of the inflamed vein is easily distinguished by its redness, by its feeling like a cord of greater or less length beneath the skin, as thick and sometimes thicker than a goose-quill with protuberances at uncertain distances corresponding to the situation of the valves. This cord-like character depends upon the coagulation of the contained blood, "the coagulating lymph (fibrin) undergoing," as HUNTER (*b*) observes, "some changes in its passage through the inflamed vessels, which obliges it to coagulate more immediately or much sooner than it would otherwise, for, in those cases of inflamed arms after bleeding, and in inflammations in consequence of other causes, we find that the cavities of the veins are in many places furred over and in others united by means of the coagulating lymph." Now, if this coagulating lymph is similar in its productions to that which we have been describing, it must have been thrown out from the *vasa vasorum*, these vessels having separated it and poured it into the cavity of the veins, and it must there have coagulated immediately in this separation, therefore, from the blood, it must have undergone some change, arising from the action of the vessels, for, if this lymph was no more than the coagulating lymph, with its common properties, or the properties common to that which is circulating in the same vein which receives it, it would in such cases only continue to throw in more coagulating lymph, in addition to what was circulating, and therefore probably it would be carried along with the blood to the heart as a part of the common mass. From this we should infer that this coagulating matter is not simply the coagulating lymph such as it was when circulating, but somewhat different, from having undergone a change in its passage through the inflamed vessels, partaking of the disposition of those solids through which it passed * * *. But this may be taken up in another point of view, and upon the same principle, the inflamed vessels may give a disposition to the blood as it is moving slowly along, to coagulate on its surface, and this is probably the more just idea of the two, as we find that the vessels both veins and arteries can give this disposition, and to a very great extent we find, in the beginning of mortification, the blood coagulating in the vessels so as to fill them up entirely, and this, preceding the mortification, seems to be for the purpose of securing the vessel before it is to give way, we, therefore

cannot doubt of a coagulating principle being given to the blood from the vessels" (p 311, 12)

Accompanying the redness and cord-like feel there is more or less tenderness, and even actual and severe pain. The inflammation continues to extend towards the heart, presenting, as it proceeds, the same characters. Not unfrequently a chain of little abscesses take place generally at the protuberant valves, which burst of themselves, but are best laid open. The constitutional excitement varies considerably, sometimes is trifling, but sometimes very severe. With constitutional and local antiphlogistic treatment, leeching, fomenting and poulticing, the disease, however, is not unfrequently checked, the inflammation subsides, and the cord-like condition alone remains, which requires some time for its removal. If suppuration in form of little abscesses, as just mentioned, occur, the inflammation oftentimes ceases, and the case does well, but, if suppuration do not occur, then the disease becomes dangerous — J F S

Attention has long been drawn to the severe form of phlebitis, for, more than fifty years since HUNTER (a) observed that "in all cases where inflammation of veins rises high, or extends itself considerably, it is to be expected that the whole system will be affected. For the most part, the same kind of affection takes place which arises from other inflammations, with this exception that where no adhesions of the sides of the vein are formed, or where such adhesions are incomplete, pus passing into the circulation may add to the general disorder, and even render it fatal" (p 26). And, having seen inflammation propagated along the jugular vein of horses into their chest, and followed by death, HUNTER says — "But what is the particular circumstance which occasions their death I have not been able to determine, it may either be, that the inflammation extends itself to the heart, or that the matter secreted from the inside of the vein, passes along that tube in considerable quantity to the heart, and mixes with the blood" (p 25). This suggestion of HUNTER's was, without having seen a case, converted by ABERNETHY (b) into an actuality, when he ascribes the great sympathetic fever occurring in an extensively inflamed vein, not simply to the inflammatory excitement, but also "because irritation will be continued along the membranous lining of the vein to the heart". HODGSON (c) copies this statement of ABERNETHY's, for, in the single case of inflamed vein which he gives, he says distinctly, that "the vena cava superior was healthy. The diseased appearances were not gradually lost, but terminated abruptly, the heart was healthy," whilst "the external jugular and the subclavian veins were filled with pus, and when slit open were found to be much thickened and lined with lymph" (p 514). He considers that "the constitutional irritation which is accompanied with symptoms of greater debility than acute inflammation in general, may probably arise from the extent of the inflamed surface, but that it is not unlikely it may be an effect produced upon the nervous system by the pus which is secreted into the vessel being mixed with the circulating blood" (p 518). CARMICHAEL (d) holds that the symptoms presented in phlebitis "were no doubt owing to the formation of matter, and the influence which it must produce on the general system when mixed with the mass of blood" (p 368). And BOUILLAUD (e) also ascribes the typhoid symptoms to the presence of pus in the system. TRAVERS (f), however, does not agree with these writers as to the existence of pus being the cause of the symptoms. He first distinguishes between the inflammation which terminates in the formation of pus, and that which terminates in depositing adhesive matter or lymph, extends to the trunks of the system, and sometimes, it is said, reaching the heart. The former condition is a protracted irritation, causing hectic and ending in exhaustion, the latter a typhoid fever which, speedily producing delirium, terminates within a few days. Cases of the first kind, though always dangerous, sometimes recover, but of the second, he believes, never. He then proceeds — "There have been many con-

(a) Observations on the Inflammation of the internal Coats of Veins in Transactions of a Society for the Improvement of Medical and Surgical Knowledge, vol 1 London, 1798 8vo

(b) On the occasional Ill Consequences of Venesection, in his Surgical Works, vol II

(c) As above

(d) Observations on Varix and Varicose

Inflammations, in Transactions of the King's and Queen's College of Physicians in Ireland, vol II Dublin, 1818 8vo

(e) Recherches Cliniques pour servir à l'Historie de la Phlébite in Revue Médicale, June, 1824

(f) Essay on Wounds and Ligatures of Veins, in COOPER and TRAVERS'S Surgical Essays, vol 1 3d Edition London, 1818 8vo

lectures respecting the cause of the fatal termination of these cases, at which I confess I feel surprised, among others, the inflammations, by extension, of the heart or the membranes of the brain and the conveyance of pus into the circulation have been mentioned. Not to insist on the innocuous quality of pus, it should be observed, that the most rapidly destructive inflammation is that which has the true adhesive progress, in which no pus is secreted. But, if we consider the importance of the veins in the economy, the extent of surface which the collective areae of the venous trunks afford, larger, I imagine, than any of the shut sacs of the body, and the diffused and disorganizing character of the inflammation, we can surely be at no loss to account for the disturbance of the system. It is an error to suppose that any quicker sympathy exists between the constitution and the venous, than the arterial or absorbent system. I say this because I have observed something like that superstitious alarm which is excited by events that we do not expect, and cannot explain, has been produced by the fatal catalogue of tied veins, and a comparison of this with the generally successful cases of tied arteries. All the mystery of veins is, as I have attempted to show, that they are indisposed to inflame, but, when excited, inflame by continuity, and therefore it is that the constitution sympathizes so deeply" (p 286). In a very excellent paper on phlebitis, ARNOTT (*a*) deduces from the collation of cases "the total disproof of the assertion, that death results from the extension of the inflammation of the vein to the heart." In none of the ten instances following venesection was the superior cava affected, much less the heart, and, in half this number, inflammation had not reached to the subclavian or even to the axillary vein. In the cases where the inferior cava had become inflamed, the first is the only one in which the heart is represented to have been actually implicated, and here, the deposition of lymph terminating at the entrance of the emulgent vein, the observation is, that there were marks of diffused inflammation extending to the right auricle of the heart, but the signs of adhesive inflammation terminated as above" * * *. With the exception of the instance just alluded to, I have only found two others in which it is alleged that the inflammation had extended from the vein to the heart, and in these the description is not very precise. Both cases are mentioned by RIBES (*b*). In one, occurring so far back as the year 1799, where the veins of the arm were inflamed in connexion with gangrene of the hand from chil-blain, "traces of inflammation" are stated to have been continued into the superior cava, and even to the interior of the right auricle and ventricle, and, in the other instance, where the saphena evinced some signs of inflammation, in a case of mortification of the leg and foot, it is stated, in the same vague terms, that "the right auricle and ventricle of the heart, as well as the inferior cava at its insertion into this organ, had manifest traces of recent inflammation." It is to be regretted that RIBES has not distinctly specified what the "traces" were which he considered as indicative of inflammation in the lining membrane of the heart (p 42, 43). From ARNOTT's statement, it appears farther that "there are considerable differences in the extent of vein occupied by inflammation in fatal cases of phlebitis. Sometimes the disease has spread into several or most of the veins of a limb from that primarily affected, at others it has not proceeded beyond the vessel in which it originally appeared," sometimes is "limited to a few inches only of a vein," and thus "justifies the inference that the dangerous consequences from phlebitis bear no direct relation to the extent of the vein which is inflamed" (p 44). As regards the contents of the inflamed vessels, "in a number of them, where an open wound existed in the vein, pus was discharged from it during life, whilst in fourteen cases out of seventeen, pus, or pus in conjunction with lymph, was present in the vessel after death. In two instances, no mention is made of pus, the contents of the veins being described in the one as "adhesive matter," in the other, where the cava was concerned, as "flakes of lymph." In one case only, where the inflammation occurred in a vein previously diseased, or in a vein, the branches of which at least were varicose, neither pus nor lymph was found in the vessel. "It results from this statement, that, although pus is present in the great majority of fatal cases of phlebitis, and that, although it should appear from the character of the general symptoms, and the effects produced upon animals by the injection of a similar fluid into their vessels, the passage of pus into the circulation is probably the principal, yet the circumstances do not justify us in regarding it as the sole, cause of the secondary affection.

(*a*) A Pathological Inquiry into the Secondary Effects of Inflammation of the Veins, in Medico Chirurg Trans, vol xv 1829

(*b*) Revue Medicale for July, 1825

In addition to the presumed absence of pus in two instances, and its declared absence in a third, it may be remarked that the early appearance of the symptoms in some cases seems scarcely to correspond with the time usually required for the production of pus, as in one which occurred to FREER, (quoted by HONGSON, p 551,) where they came on suddenly, four hours after ligature of the saphena" (pp 44, 45)

"The secondary affection in phlebitis usually shows itself in from two to ten or twelve days after the receipt of the injury which has occasioned the inflammation in the vein, where the vessel has been previously diseased, sometimes sooner * * * The duration of this affection offers some variety," (pp 51, 53,) death taking place at different periods from the fourth day to the end of the seventh week. The remarkable morbid appearances recited by ARNOTT are, "in the chest, effusions of sero-purulent fluid into the cavities of the pleura and pericardium, exudation of coagulable lymph on the surfaces of the heart and lungs, hepatisation of the latter organ, infiltration of pus into its tissue, or small collections like a mixture of pus and lymph, pus also in the muscular substance of the heart * * * In the cellular substance, intermuscular as well as subcutaneous, pus and sero-purulent fluid have been extensively deposited, sometimes in collections like abscesses, at others, appearing more like an effusion into its cells than as resulting from the common process of inflammation. These collections more frequently occur in the vicinity of joints * * * In the joints, a most violent inflammation of the synovial membrane, its distension with purulent matter, destruction of the cartilage and baring of the bones * * * In the eye, opacity of the cornea, injection of its blood-vessels, and destructive changes in its humours or its coats. Besides these affections, there were found in five instances within the cranium opacity and thickening of the tunica arachnoides, effusion between it and the pia mater, and increased secretion into the ventricles. In nine the head was not examined, and in three no morbid appearances were noticed" (pp 53, 57) The conclusion at which ARNOTT arrives is, "that death in cases of phlebitis does not take place from the inflammation extending to the heart, whilst the history and character of the symptoms which precede this event, the very small portion of vein which is sometimes found to have been inflamed, and the general presence of pus in its cavity, all tend to establish, that the entrance of this fluid into the circulation is the principal cause of the alarming and fatal consequences of phlebitis, a similar influence being perhaps also possessed by any inflammatory secretion from the vein" (p 61.)

On the inflammation of the femoral and iliac veins, which occurs in puerperal women, which sometimes, but not always, gives rise to *Phlegmasia dolens*, Dr. ROBERT LEE (a) observes, that, "whether the inflammation of the coats of the veins be simple adhesive inflammation, or inflammation of a specific kind connected with the puerperal state, and differing, not only in the degree of intensity, but in its essential nature from phlebitis after venesection, it is difficult to determine. The peculiar character of the symptoms seems strongly to favour the latter opinion, though it cannot be denied that the disease occasionally assumes the form of common phlebitis, fatal cases having occurred where pus has been found secreted by the internal coats of the iliac veins, and death caused by inflammation and apostematos deposits of matter in the lungs and other remote organs of the body" (p 145)]

In the *Absorbent Vessels*, inflammation arises either from external injuries and so on, or from some morbid matter which they have taken up. It is indicated by painful red swelling of the absorbent vessels up to the nearest gland. It usually terminates in resolution.

[Inflammation of the absorbent vessels may arise without either injury or the absorption of morbid matter, but simply from irritation, as frequently seen in whitlow or other inflamed condition of the fingers or toes, as when they have been chaffed or after the application of a blister. The red streak or streaks which indicate the inflamed absorbent vessel or vessels, is generally little thicker than a stout thread, pale towards its edges, can at first scarcely be called a swelling, but is more like a streak of paint on the skin, and only after some time has a slightly knotted feel. It runs along the limb with great rapidity, and will in the course of a few hours enter the cavities of the trunk. It terminates in suppuration less frequently and less quickly than inflammation of the veins. Generally it subsides as the irritation which has

(a) On the Pathology of *Phlegmasia dolens*, in *Medico Chirurg Trans* vol xv 1829

excited it is relieved, and I do not remember to have observed continuance of the cord-like feel long after the inflammation has ceased —J F S

In reference to these red streaks, HUNTER observes —“These reddish streaks are supposed to be absorbents, becoming inflamed by their carrying a stimulating fluid I am apt to suppose them to be absorbents, but I do not conceive that this effect arises from absorption. If it arose from such a cause, it should be uniform, the cause should always exist when the effect takes place It is first to be observed that it only takes place in certain constitutions, in which absorption one way or other explains nothing, and I find upon observation that this effect shall be coeval with the inflammation where no suppuration has taken place I have even seen it arise from accident, prior to the possibility of inflammation taking place, viz , in the time of the pain arising from the immediate effects of the accident, this was in the finger, from the prick of a clean needle, which had been for some time pricking new buckskin leather, the glands in the arm-pit were sore, sickness attended with its usual symptoms, such as oppression, was nearly immediate Its direction from the source of the circulation is another strong proof of its not arising from absorption, and its taking place at some distance is also a corroboration of the same opinion Another strong circumstance in favour of this opinion is, that the morbid poisons do not produce this effect where we know absorption has taken place Thus the venereal seldom or never produces it ” (p 275)

I have seen earthy deposits in the absorbent vessels of the skin, and also of the spermatic cord, giving them the appearance of corallines —J F S]

Inflammation of *Nerves* or rather of their sheaths is no very rare circumstance As the nerves have but few nutritive vessels, the usual symptoms of inflammation, viz , heat, redness, and swelling, are present only in a slight degree It begins with formication, torpor, frequently with severe darting pain, which spreads in paroxysms, like electric shocks, along the branches of the nerves , and to these are added febrile excitement, cramps, and convulsions The inflammation may have either a *chronic* or *acute* course , the former we observe in *ischias nervosa* and many neuralgics, the latter in *tetanus*, *hydrophobia*, and so on On examination we find the nervous sheaths especially affected, reddened, swollen , the nervous matter is frequently dissolved, as if gangrenous , often there are produced exudations in the nervous sheaths, or degeneration of the nerves

Inflammation in the *Bones* occurs either in the periosteum or in the medullary membrane, or in the substance of the bone itself In all these cases the symptoms are different, especially according to the acute or chronic course of the inflammation In inflammation of the *Periosteum*, (*Periostitis*,) a circumscribed swelling with more or less acute pain is produced by exudation between the bone and the periosteum If the inflammation do not resolve, it runs on to hardening, gouty thickening, exostosis, into caries, necrosis, and more rarely into fungous degeneration Inflammation of the *Medullary Membrane* is characterized by deep-seated, gnawing pain, at last the bone itself swells throughout its whole thickness , and, if the inflammation do not resolve, it runs on to closing up of the medullary canal, or suppuration and destruction of the bone from within outwards, in necrosis or fungous degeneration In inflammation of the *Bone* itself thickening throughout its whole extent (*Hypertrophy*) may occur, with closing of the medullary hole, ulceration, necrosis, and different kinds of degeneration of the bony tissue

42 The *Prognosis* of inflammation is very various , it depends especially on its severity and character, on its causes, on the constitution of the subject, and on the parts in which it is situated

43 The *Treatment* of inflammation generally purposes to effect its resolution, except in certain critical inflammations, in wounds with much contusion, and in furuncles

The first indication is the removal of the cause, if it continue to operate. If the inflammation be not very great, this alone is often sufficient. If the cause cannot be removed, or the inflammation have advanced to a certain extent, the plan of treatment includes all the means which are implied in the term antiphlogistic mode of cure. In those inflammations which are connected with much fever we must employ bleeding, nitrate of potash, and other antiphlogistic remedies, with cooling diet and rest. If the inflammatory symptoms are thereby diminished, calomel is specially useful to hasten the absorption of the lymph effused into the cellular tissue, and to prevent its coagulation. If the inflammation have an erythritic character, if it be accompanied with greatly increased sensibility, we endeavour after the above-mentioned antiphlogistic treatment to lessen it by opium in connexion with proper antiphlogistic means, such as mercury, hyoscyamus, and hydrocyanic acid, laurel water, and so on. If gastric impurities exist, they must be removed by vomiting and purging. In malignant inflammation the treatment must particularly depend on the kind of accompanying fever. The antiphlogistic treatment is then to be used only with circumspection. If the inflammation have a specific character, if it be connected with a dyscratic affection, we must act according to the degree of the inflammatory reaction, first on the antiphlogistic plan and then against the dyscracy. The antiphlogistic treatment, however, in this case, requires to be pursued with moderation.

[JOHN HUNTER, in treating "of the methods of resolution by constitutional means," makes many very excellent remarks on blood-letting, the object of which, as just mentioned, is to produce the contraction of the vessels, and which is always to go "hand in hand" with the soothing or lessening irritability, or the action of dilatation, by means of sedatives, relaxants, and stimulants, sudorifics, &c. Neither of these proceedings "can possibly lessen the original inflammatory disposition"; they may, however, "in some sense be reckoned direct, for, whatever will produce the action of contraction in the vessels, is counteracting the action of dilatation." Lessening the power of action belonging to any disposition can only lessen or protract the effects, which, however, will be of singular service, as less mischief will be done, and it will often give the disposition time to wear itself out. Means employed on this principle, should be such as give the feel of weakness to the constitution, which will affect the part, and will make the vessels contract, but this practice should not be carried so far as to produce the sense of too much weakness, for then the heart acts with great force and the arteries dilate. Bleeding, then, as a general principle, is to be put in practice but this must be done with judgment, for I conceive the effects of bleeding to be very extensive. Besides the loss of any quantity of blood being felt, in proportion to the quantity lost, a universal alarm is excited, and a greater contraction of the vessels ensues, than simply in proportion to this quantity, in consequence as it would appear of a sympathetic affection with the part bleeding.

"As many patients that seem to require bleeding have been already bled, it may not be improper to inquire how they bear or are affected by bleeding, for, certainly, all constitutions (independently of every other circumstance) do not bear this evauation equally, and it is probable, that its effects on inflammation may be nearly in the same proportion, if so, it becomes a very useful caution, for, although the loss of blood may as a general principle be set down as a weakener, and probably the greatest, as we can kill by such means, yet the loss of certain quantities in many constitutions is necessary for health, this is either when there is a disposition to make too much blood, or a constitution that cannot bear the usual quantity, in such, when known, bleeding with freedom is certainly necessary."

part of the body under inflammation will not bear bleeding alike I believe that the constitution bears bleeding best when the inflammation is in parts not vital, and those near the source of the circulation whatever disturbs some of the vital parts, depresses, but not equally in all, and in them it becomes more necessary to be particular, for, in accidents of the brain, bleeding freely, even so as to produce sickness and fainting, is necessary It is probable that the sickness attending such accidents, is designed to lessen the influx to the head, and occasion the vessels of the brain to contract " (pp 335, 7)

"With regard to this evacuation," (blood-letting,) he observes farther, "it is worthy of particular consideration, whether or not in all cases, where it can be put in practice, bleeding in or near the part will answer better than taking the blood from the general habit, for certainly less may be removed in this way, so as to have equal effect upon the part inflamed, (and probably upon every disease that is relieved by bleeding,) and yet affect the constitution less, for, although, in many cases, the general habit may be relieved by bleeding, yet the part affected, where it can act, will in all cases require this evaeuation most, and local bleeding will keep nearer these proportions, whereas taking blood from the general system is just the reverse * * * I have observed that there is something similar to sympathetic affection in bleeding I conceive that all the sympathetic powers, the universal, continued and contiguous, may be brought into action from the local influence of bleeding Thus, bleeding in the part inflamed, I can conceive, does more than simply emptying the vessels mechanically, for that would soon be restored from the general circulation, but it acts by continued sympathy, viz , the vessels of the part being opened, they contract for their own defence, and this is carried farther among the vessels of the part, so that bleeding from the part acts in two ways, viz , mechanically by relieving the vessels of some blood, so as to allow them to contract in proportion as the load is taken off, and also to excite them to contraction in order to prevent the effusion of blood I suppose, likewise, that contiguous sympathy comes into action, for this would appear from practice and observation to be a principle in bleeding therefore, in inflammation of contiguous parts it is proper to bleed from the skin opposite to them " (pp 338, 9)

"Where the first indication for bleeding takes place, viz , where there is violent inflammation, with strength of constitution, bleeding freely will be of singular service * * * As it seldom happens that bleeding once will be sufficient in a considerable inflammation, the first or preceding blood taken becomes a symptom of the disease * * * On the other hand, there may be indications for bleeding sparingly, first, when there is too much action with weakened powers, secondly, when there is a disposition to form but little blood, thirdly, when the part affected is far from the source of the circulation From the above three dispositions that require bleeding sparingly or with caution, I may observe, that it will most probably be proper in all such cases to bleed from, or as near, the part affected as possible, in order to have the greatest effect with the loss of the least quantity of blood, more so than when the constitution is strong, because the constitution in such cases should feel the loss of blood as little as possible * * * But in many cases the blood cannot be taken away from the part itself, but only from some neighbouring part, so as to affect the part inflamed " (pp 339, 40)

"Bleeding should in all cases be performed with great caution, more particularly at first, and no more taken than appears to be really necessary, it should only be done to ease the constitution, or the part, and rather lower it where the constitution can bear it, but, if the constitution is already below or brought below a certain point, or gives the signs of it from the situation of the disease, then an irritable habit takes place, which is an increased disposition to act without the power to act with This of itself becomes a cause of the continuance of the original disposition, and therefore will admit neither of resolution nor suppuration, but continue in a state of inflammation, which is a much worse disease than the former " (p 344)

44 Different as is the *General* treatment of inflammation, no less so is the *Local* The local means are, *abstraction of blood, cold, moist, or dry warmth, salves and plasters, astringent, anodyne and derivative means*

["Wherever," says JOHN HUNTER, "there has been a violence committed, or some violent action is going on, there is a greater influx of blood to that part Lessening therefore that influx becomes one mode of relief, for, as the vessels dilate, they

should not be encouraged in that action. Although the increased influx is to be considered chiefly as an effect, yet it is to be considered as a secondary cause, and, from our ignorance of the immediate cause, it is probably only through such secondary causes that we can produce any effect, and upon these principles most likely rests, in some measure, the method of resolution, for, whatever will lessen the power and disposition will also lessen the effect, and possibly these will likewise lessen the force of the circulation. If the inflammation is attended with considerable action and power, as it were increasing itself, then the modes of resolution are to be put in practice, the one by producing a contraction of the vessels, the other by soothing or lessening irritability, or the action of dilatation. The first, or contraction of the vessels, is produced in two ways, one by producing weakness, for weakness excites the action of contraction of the vessels, the other by such applications as induce the vessels to contract" (p 335)]

45 *Local Bleeding* is more indicated as the inflammation is more simple and active, the redness and swelling greater. Every local blood-letting is connected with a certain degree of irritation which may at once reproduce an increased influx of blood. This is the more certain when general plethora is present. It is therefore necessary in many cases to employ general previously to local bleeding. Local blood-letting is performed by *leeches*, *scarifications*, and *cupping-glasses*. Leeches are most commonly employed, scarifications are restricted to those cases in which the application of leeches is not possible, as, in the mouth, on the tongue, in the throat, on the conjunctiva. Cupping is more especially suited to lingering and deep-seated inflammations, inasmuch as, besides the abstraction of blood, it also operates as a powerful derivative on the surface.

46 The employment of *cold* by the overlaying of cloths dipped in cold water, in water and vinegar, in water cooled by the solution of different salts, in solutions of acetate of lead or sulphate of zinc, the application of ice and snow, is only indicated at the commencement of idiopathic inflammation, when but little swelling has taken place. These means must always be preserved at the same degree of cold. They are specially active in inflammations caused by severe bruises, lacerations, and so on, when there is accompanying weakness of the vessels, and their effect may then be still more increased by the addition of spirituous remedies, for example, brandy, THEDEN's arquebusade, and so on.

[In using ice or freezing mixtures, care must be taken, lest, by their too long continuance, the vitality of the part is destroyed, and sloughing of the skin produced, which has occasionally happened —J F S]

47 *Moist warm remedies* are employed in shape of fomentations and poultices, which are made of mucilaginous or merely substances, from linseed-meal, bread crumbs, oatmeal, bran, marshmallow leaves, emollient herbs boiled with water or milk put into linen bags and laid in such way as at once to cover the whole neighbourhood of the inflamed part. Poultices are preferable to fomentations, as their warmth is retained longer and they need less frequent renewal. Fomentations are therefore only employed in cases where the part is so sensitive that it cannot bear the pressure of the poultice, they must also extend over the whole neighbourhood of the inflamed part, and be covered with a dry towel or flannel by which the heat is longer retained. These remedies are especially applicable to large swellings and painful tensions, as, by their relaxing properties, they diminish the resistance of the cellular tissue. If the tension be less, the poultice may be moistened with lead wash,

Many inflammations, as gouty and erysipelatous, do not consort with the employment of moist remedies, but only with *dry warmth*. When the pain is very severe, narcotics, as the fresh hyoscyamus, belladonna, and so on, may be added to the poultices. With these moist warm remedies are usually also employed the infliction of emollient salves, especially mercurial ointment, in order to further resolution by hastening the absorption

[“Fomentations, or steams, washes, and poultices,” says HUNTER, “are the common applications to a part in the state of inflammation. The first and last are commonly applied to inflammation arising from external violence and proceeding to suppuration, the second commonly to internal surfaces, as the mouth, nose, urethra, vagina, rectum, &c. The action of the first two is but of short duration.”]

“Fomentations and steams are fluid bodies raised into vapour they may be either simple or compound, simple, as steam or vapour of water, compound as steam of water impregnated with medicine * * * Washes are in general fluid applications, and are more commonly applied to inflammations of internal surfaces, than of the common integuments there are washes to the eye, called collyria, washes to the mouth and throat, called gargles, washes to the urethra, called injections, and to the rectum, called elysters * * * These applications, like fomentations, are of short duration, for there is no possibility of applying these powers constantly, except in the form of a poultice, whose operation is somewhat similar, and indeed they are only substitutes for a poultice, where that mode of application cannot be made use of, as I observed with respect to internal surfaces.”

“Poultices are constant applications, and like fomentations may be of two kinds, either simply warm and wet or medicated. The greatest effect that a poultice can produce must be immediate, but its power will extend beyond the surface of contact, although only in a secondary degree.”

“To the common inflammation, the simplest poultice is supposed to be the best, and that effect I believe is only by keeping the parts easier under the complaint, but I am of opinion that such do not affect the inflammation any other way. A common poultice is, perhaps, one of the best applications when we mean to do nothing but to allow nature to perform the cure with as much ease to herself as possible. Poultices may be medicated so as to be adapted to the kind of inflammation” (pp 361, 362.)

ABERNETHY’s observation that “poultices are blessings or curses as they are well or ill made, and that more commonly they only irritate instead of doing good,” though it may excite a smile, is borne out by daily observation, for, instead of the highly sensitive surface of an inflamed part being soothed, as it should be by the application of a poultice, “the three properties of which are,” to use that excellent teacher’s words, “that it should be perfectly soft, perfectly smooth, and perfectly moist,” it is too frequently irritated by loading with a heap of hard and lumpy materials which soon dry, and almost as soon become sour.

The *bread and water poultice* is the best, and in general most suited for all circumstances, either as a simple application, or as a vehicle for the employment of the juices of substances which in themselves are too harsh to be applied to very sensitive parts. To make this poultice, ABERNETHY directs — “Scald out a basin (for you can never make a good poultice unless you have perfectly boiling water) and put boiling water in it, throw in some coarsely crumbled bread crumbs, and cover it up with a plate. When as much water has been soaked up as the bread will imbibe, drain off the rest, and a light pulp (not to be beaten into paste, as usually done, but merely broken with the edge of a fork) is then left, which is to be spread the third of an inch thick, on folded linen, and applied at the temperature of a warm bath.” If it be advisable to medicate the poultice, the juice of fresh hemlock, decoction of carrot, or opium, or any other material in solution, may be added to the sodden bread after it has been well drained, and thus is formed a very soothing application. It is best not to add lard or grease of any kind to a bread poultice, as thereby its relaxing effect on the skin is diminished or destroyed. But as, if left exposed to the air, it soon cools, dries, gets hard, and becomes uncomfortable and irritating, it must be either continually moistened by the dropping on it, from a sponge, warm water or the warm medicated solution through the linen, without removing it from the part to which it is applied, and under which circumstances

it acts to a certain extent by evaporation, diminishing the increased external heat, and lessening the action of the vessels, though the warmth of the water prevents its reduction to coldness. But, if suppuration have set in and it is necessary to keep up the warmth, then the cloth containing the poultice must be enveloped in a piece of oiled silk, which retains the moisture, and be overlapped with flannel, which preserves the warmth. Milk is often used instead of water for making poultices, but, if the skin be unbroken, water is preferable. No poultice should be boiled, as it is merely converted into paste.

The *linseed-meal poultice* is to be made like the former, by throwing the meal into perfectly boiling water, but it requires well beating to remove all the lumps, and is then to be spread a quarter of an inch thick on linen. It is not a good application for inflamed parts on account of its weight, and, indeed, under any circumstances, it is best if made with an equal quantity of bread crumbs.—*MS. Notes of Lectures*

In cases where warmth is most agreeable to the patient's feelings, and in which fomentations are employed, either because thin flannel dipped in them is lighter than the poultice, or because the surface to be covered is so large that a flannel is most convenient, the moisture and warmth are easily preserved by enveloping the overlaying flannel with oiled silk, this treatment has also the advantage of not so repeatedly disturbing the patient as the flannels alone do.—J. F. S.]

48 In the *Torpid* inflammation this character may show itself from the first or during its progress when the expansion is more passive, and the vessels over distended, with diminished reaction, the congestion of the vessels must first be relieved by local blood-letting, and then the vital activity must be aroused by exciting remedies, by the momentary use of cold, by overlaying with watery or vinous infusions of aromatic herbs, by warm applications of lead wash or THEDEN's arquebusade, by infraction of volatile salves of mercurial ointment with camphor, by the application of irritating plasters, of ammoniacum plaster, which we specially use at night, because the applications very readily cool. With these local remedies a corresponding general treatment according to circumstances must be coupled.

The local and general use of stimulating and irritating remedies in many cases of inflammation is not contradictory to the above-mentioned conditions, and does not mislead to the recognition of the so-called *asthenic inflammations*. There is no inflammation depending on weakness, certain states of disease may, however, co-exist with inflammation, or be produced by the consumption of vital activity, caused by the inflammation, by the removal of which alone a cure of inflammation is possible.

49 The *derivative remedies* are founded on the law of reciprocal action in our constitution, by which means an existing irritation may be lessened or removed by a more severe one. To this class belong blisters, setons, issues, and the rubbing-in of irritating salves. In general these are only to be used when the severity of the inflammation has been moderated by the preceding treatment, they are particularly useful in chronic inflammation.

In how far this general mode of treating inflammation must be modified according to the differences of the structure affected, will be subsequently considered in many places.

[“Derivation,” says HUNTER, “means a sensation of action in one part, in consequence of an action having taken place in another and when this is a cessation of a diseased action, then a cure of that action in the original part may be said to be performed. This cure was brought into use from the idea of humours, that is, the drawing off of the humours from the seat where they had taken possession but I believe much more has been ascribed to it than it deserves. How far it really takes place, I have not been able fully to ascertain in all its parts, that is, how far the real disease has been invited, and accepts of the invitation but I have already observed

that there is such a principle of disease in the animal economy, although we must see from derivation, that the same quantity or perhaps more irritation is retained in the constitution, yet the artificial irritation produced being either such as more readily admits of a cure than the diseased part, or being in parts which are not so essential to life, an advantage by this means is gained" (p 359)]

50 If the inflammation have a disposition to recede, every thing must be removed from the inflamed part which can disturb the proper development of the inflammation and favour its recession. The inflamed part must be covered with warm flannel, it must be protected from the approach of the air, and medicines given internally which will act on the skin — If the inflammation have already subsided from the external surface, we must endeavour to bring it back by mustard plasters, blisters, and cauteries, it must be treated generally according to the severity and character of the inflammation

51 If the inflammation have run on to exudation, and inflammatory symptoms still remain, antiphlogistic neutral salts must be employed, especially bitartrate of potash, but, if accompanied with weakness and inactivity of the absorbents, then exciting remedies and such as act upon the kidneys must be used, as mercury, squills, digitalis, senega, and so on. If the accumulation be so great that it interferes with the active functions of important viscera, or cannot be removed by the methods already proposed, the fluid must be discharged by opening the cavity in which it is contained. In œdematosus swelling of the cellular tissue, bags of warm aromatic herbs, mingled with camphor, must be used, in torpid subjects flannel fumigated with mastic and amber, and a moderate compression by means of bandages may be employed

52 If the symptoms described (*par 10*) indicate a transition of the inflammation to suppuration, nature must be assisted in this process. In strong persons, and with a certain degree of inflammation, suppuration in general is effected without difficulty, and it is sufficient to employ a less active general treatment, emollient fomentations and poultices. If the pain be more severe, narcotic poultices may be used, and, in decided hardness and inflammation, even blood-letting. But if, on account of the weakness of the constitution, or the torpid character of the inflammation, the formation of pus is tedious, it must be assisted by stimulating remedies, roasted onions, yeast must be mixed with the poultices and applied warm. The diseased parts must be covered with rye flour and honey, with *emplast de cicutâ c ammoniaco*, *emp galb*, *emp diachylon comp*. All these, however, may be dispensed with by the suitable and constant application of warm lotions and poultices

53 When under this treatment of abscess its *opening* has taken place, that is, if about its circumference hardness is no longer to be felt, it either opens of itself or it must be opened. Only in small abscesses just beneath the skin, and in those in glandular structures, may the opening be left to nature (1). The early opening of abscesses is not unfrequently required, and specially under the following circumstances 1 if in sensitive parts severe pain arises from the collection of pus, and the tissue of the part is thereby rendered tough and unyielding, 2 if the pus be collected beneath muscles and firm aponeuroses, in which case its burrowing is to be dreaded, 3 in abscesses in the neighbourhood of important organs surrounded with loose cellular tissue, for instance, abscesses in the neighbourhood

of the rectum, or in the neck, where the pus may spread to the collar-bones, 4 in abscesses on the joints, or in the neighbourhood of other cavities, where, however, bursting into these cavities is not so much to be feared as the symptoms resulting from the pressure of the pus, 5 if the suppuration be near a bone or a tendon, 6 if by long continuance of the inflammation the cellular tissue beneath the skin be destroyed to a considerable extent, 7 and in critical abscess

Abscesses in the neighbourhood of important parts are generally opened rather late, because in a large collection of pus the elevation of the skin ensures against any injury to deep-seated parts

[(1) This is not good practice, abscesses just beneath the skin should always be punctured early, as otherwise there is great risk of sloughing of the integument and the formation of an ugly scar. Neither should abscesses in glands be left to burst, which is often a very tedious process, as the capsule of the gland does not readily ulcerate, and will not till the whole, or nearly the whole gland is destroyed, a large cavity is thus formed, which is generally very difficult to heal, as it assumes often-times a fistulous character. It is therefore always best to puncture a glandular abscess as soon as the capsule and the skin have become adherent, and the angry appearance of the latter indicates its disposition to ulcerate. But it is not unfrequently advisable to open such abscesses before the skin reddens, or even before it is adherent, for, in scrofulous and chronic abscesses, there is often little and sometimes no redness of the skin, and yet, the collection of pus increasing, the skin becomes stretched beyond endurance, and sloughing ensues — J F S]

54 The *opening of abscesses* (*Oncotomia*) is effected either by a *cutting instrument*, by *escharotics*, or by *seton*. That point is preferred for opening where the fluctuation is most distinct and the skin thinnest, but, if the skin is every where equally thin, then the lowest part is preferred — The size of the opening depends on the extent of the abscess, and should always be such that the pus will flow without hinderance. An aperture of five to eight lines long is generally sufficient, an opening of an inch and a half must be the extreme for an abscess of large size. It must be recollectcd, however, that the skin, distended by the pus, will contract after its evacuation, and thereby the aperture will be rendered smaller than was intended.

55 The *cutting instrument* is used in the following manner the blade of the *lancet* being held with the finger and thumb of the right hand, sufficiently far from the point to permit of its entrance into the cavity of the abscess, and the skin covering the abscess being stretched by the fingers of the left hand, the lancet is to be thrust perpendicularly or obliquely in till the pus, oozing up by its sides, shows that the cavity of the abscess has been opened, and the aperture is to be increased to a proper size by raising the point of the lancet as it is withdrawn.

If the abscess be deep and the coverings thick, it should be opened with a *bistouri*, which, being held like a pen, is to be thrust into the abscess in the direction of the muscular fibres, and the opening is to be enlarged on bringing it out. If the abscess be very deep, and in the neighbourhood of important parts, it is most advisable to divide the parts covering it by repeated cuts, and with the fore finger of the left hand to feel in the wound at which point the fluctuation is most perceptible. This precaution is specially to be recommended in deep abscesses of the coverings of the belly and chest.

After opening an abscess the pus must be allowed to flow out gradually

of itself, or it may be assisted by gentle pressure, every thing which can interfere with its escape must be avoided, the aperture of the abscesses should not by any means be stopped up, but only covered lightly with charpie and a warm moist poultice, or merely with the latter

[Pressing and squeezing abscesses, for the purpose of emptying after they have been punctured cannot be too much deprecated Unnecessary pain is inflicted on the patient by the rough handling, which bruises the distended and still inflamed walls of the abscess One object in making the puncture is to relieve the tension of the adjacent parts, and the escape of a very small quantity of pus immediately effects this But the abscess empties itself sufficiently quickly by the simple contractility of the skin, which gently presses out the fluid contents with little or no pain to the patient

It not unfrequently happens that if the walls of the abscess be thick, the clean cut edges of the puncture are found adherent, and the aperture closed within twenty-four hours. The adhesions, however, are easily broken through, and the opening re-established by a little gentle pressure on the abscess But I think it preferable, after making the puncture, to introduce between the lips of the wound a very small portion of lint, with a long end hanging out, this is to be removed when the first poultice is replaced a few hours after making the puncture, which by that time is sufficiently established —J F S]

56 *Escharotics* are employed in the following manner a piece of linen spread with sticking plaster, and in which a properly shaped hole has been cut, is to be so laid upon the abscess that the aperture should correspond with the point where it is intended to be emptied The hole in the plaster is then to be filled with bruised and moistened caustic, and covered with sticking plaster After six or eight hours the plaster is to be removed, if the caustic have produced a good slough, or the walls of the abscess have been eaten through and the pus escaped The slough is to be pierced with a lancet and the abscess emptied, or, if the emptying does not seem urgent, the slough may be allowed to separate, and then the lancet is to be introduced The pus is to be discharged by moderate pressure in an unbroken stream, the aperture to be covered with sticking plaster and a bandage applied The walls of the abscess frequently at once unite, but most commonly a smaller quantity of pus collects, the emptying of which is to be performed by a second puncture, and the union furthered by a compressing bandage

57 In passing a *seton* through an abscess an aperture with a lancet is to be made at its upper part, through which a blunt probe, armed with a bundle of several cotton threads some yards long is to be passed to the very bottom of the abscess, till its extremity is felt against the skin An assistant retains the probe in this situation, and the skin being rendered tense, a cut is made upon the probe, which is then to be drawn out and the seton introduced into the cavity of the abscess This may be done with a seton needle, in which case the parts covering the abscess are to be raised into a fold and then transfixated with the needle When the abscess is emptied, the opening is to be covered with charpie and sticking plaster, the seton thread fastened, the whole covered with a compress and supported with a proper bandage A fresh portion of the thread is to be drawn in daily. When the suppuration has diminished the threads are to be withdrawn and the union of the walls promoted by regulated pressure In many cases the seton may be removed in three or four days, if the walls of the abscess have acquired a sufficient degree of inflammation to unite by proper pressure.

58 In general the opening of abscesses with a cutting instrument is most preferable. The application of escharotics is accompanied with great pain, a part of the skin is always destroyed, in consequence of which a large scar remains. The seton is also painful and excites more or less severe inflammation. These modes of opening are therefore restricted to those cases in which it is desirable to excite a certain degree of inflammation, as will be presently mentioned in speaking of cold abscess. The employment of caustic in critical abscesses, in order to hasten and bring about their opening at an earlier period, may be conveniently replaced by the proper use of poultices, and the ordinary method of opening with the lancet.

[Puncturing abscesses is in all cases to be preferred. Escharotics are never permissible, as they produce a certain slough, the prevention of which is one object in emptying an abscess. The introduction of a seton is almost as objectionable, for the inflammation of the sac of the abscess which it excites will often be uncontrollable and hasten hectic fever —J F S]

59 The so-called *Cold Abscess* (*Lymph-Abscess*) resulting from lingering inflammation, (*par* 15,) in which the covering skin is but little or not at all changed, may sometimes be dispersed by resolving poultices, infusions, and plasters, by producing artificial wounds in the neighbourhood, by the application of the moxa, and so on, with simultaneous attention to the constitutional disorder. This, however, seldom happens, and since, after they have been opened in the way of ordinary abscesses, or have opened of themselves in consequence of the diminished vital activity, of their walls, and the generally depressed state of the system, a very ill-conditioned and frequently fatal thin and copious suppuration sets in, special modes of proceeding in the treatment of these abscesses are therefore directed, in order partly to prevent the entrance of the air in opening them, partly to excite by the emptying of the swelling, such degree of inflammation as will produce their union, or the secretion of a good plastic pus, and then the cure is effected as in common abscess.

60 The modes of treatment to this end are, the emptying of the swelling with a lancet puncture or with a trochar, without admitting air, after which the opening is to be closed with sticking plaster, a moderately compressing bandage applied, and the opening frequently remade, till the union of the walls of the abscess has taken place (ABERNETHY,) opening with the lancet after the previous application of caustic (BEINL,) the introduction of a seton or a bundle of silk threads, to be withdrawn on the third or fourth day, and the cure then perfected by compression (WALTHER,) tapping with the trochar and injection of red wine, solution of bichloride of mercury, or of nitrate of silver (SHAACK,) or of boiling hot water (RUST) or a solution of fully neutralized nitrate of mercury (NASSE,) the laying open of the swelling longitudinally throughout half its length, and filling it with charpie moistened with solutions of caustic (ZANG,) and the removal of the skin from the whole extent of the swelling (CALLISEN.)

61 The variety of these modes of treatment proves, that neither of them separately taken is sufficient to meet our wishes. The choice of them must therefore be guided by the difference of constitution, by the more or less weak state of the cellular walls and by the size of the swelling. If the tumour be not very large and the constitution of the

patient still tolerably good, perfect closing of the cavity of the abscess may usually be produced by repeated puncture with the lancet or trochar, or at least it may be so much diminished that we may be able to effect a cure by laying it open with a bistoury, and filling it with charpie, moistened with irritating remedies, especially solution of nitrate of mercury. In swellings of larger size it is far preferable to make the opening with caustic, or by the introduction of a seton. If the cure be not in this way effected, and, if suppuration threatening exhaustion occur after artificial or spontaneous opening, it is proper to remove from the front wall of the swelling as much as may be allowable, or to fill the whole cavity with charpie, which according to the various degrees of irritating, is to be moistened with a stronger or weaker solution of nitrate of silver, or nitrate of mercury, to bring about a good suppuration. I am, however convinced, that by the employment of these violent modes of treatment, the very worst symptoms are often produced which are dreaded in the common mode of treating abscesses. At least, I have in very many cases of cold abscess made the opening at the proper spot in the usual way with the lancet, and, without the use of any other local means than moist warm poultices, the cure has been effected more quickly and with less trouble than by other modes of treatment. The opinions relative to the treatment of this cold or lymphatic abscess are so various, doubtless because they are confounded with *congestive abscess* and with the swellings of mucous bags (*par 17*). Corresponding general means must be employed with the local treatment, we must use strengthening remedies, bark, rhatany, sweet flag, with diluted acids, a strong nourishing diet, and attention must be paid to cleanliness and good air.

According to KLUG (*a*) the lymph should be discharged by an incision, or, if that be not sufficient, the whole front wall of the swelling must be cut away, the opening of the hardened lymphatic vessel must be found, which is usually superficial and easily discernible by the trickling of the lymph, a bristle must be introduced into its open mouth, and then the vessel must be slit up for half an inch or an inch, until the healthy trunk is reached. The bristle is then to be removed, and either a compressing bandage applied, or, if there do not occur a proper degree of inflammation, the opened lymph-vessel must be touched along the part which has been slit open with a pointed piece of nitrate of silver up to the healthy portion, and then the compress applied.

Upon the subject of opening abscesses consult

ABERNETHY on Chronic and Lumbar Abscesses, in his Surgical Works, London, 1815, vol 11 p 153

SHAACK und MURSINNA, über de oft unzulängliche Hulfe bei lymphatischen Geschwulsten in MURSINNA's Journal, vol 1 p 2, 1800

BEINL, A., von einer eigenen Art Lymphgeschwulst, und der zweckmassigsten Methode, die selbe zu heilen Wien, 1801, In Abhandl der med chir Josephin Akademie in Wien, vol 11

RUST, einige Reflexionen über die natur und Heilung der Lymphgeschwülste, in HARLESS Jahrbüchern der teutschen Medicin und Chirurgie, vol 1 p 155 And in Rust's Magazin, vol 1

JACOPI, Operationi e Sperienze fatti nel instituto clinico di Chirurgia di Pavia nel anno 1812, 1813, vol 11

CHELIUS, in neuen Chiron herausgegeben von TECTOR, vol 1 part 1

von WALTHER, über die wahre Natur der Lymphgeschwülste, in Journal für Chirurgie und Augenheilkunde, vol 1 p 584

[HARRIS, in the American Cyclopaedia of Medicine and Surgery, Phila

1834 vol 1 -- G W N]

(a) ZEMPSCH, as above

62 The further treatment after opening an abscess must be quite simple, *we must endeavour to keep up merely a free undisturbed escape of pus, and to preserve a proper vital correspondence* No further local treatment is required beyond the use of moist warm poultices The edges of the opening draw together, the walls of the abscess approach and adhere, granulations (*Fleischwurzen*, Germ) are produced from the bottom of the abscess by the development of fine vessels and delicate cellular tissue, which become more and more solid, are covered with a thin skin, and form a scar (*Cicatrix*, Lat., *Narbe*, Germ., *Cicatrice*, Fr.) A more active degree of inflammation, when continued or developed after the opening of the abscess, in consequence of which its edges swell, its neighbourhood becomes very sensitive, and the suppuration diminished, is usually consequent on improper treatment, on the use of tents and so on, and can only be relieved by the aforesaid treatment, which diminishes the irritation

63 If a proper degree of vitality be wanting in weak constitutions or in abscesses in parts far distant from the heart, if the edges of the abscess be flabby, insensible, discoloured, if a thin lymphatic sanguous fluid be secreted, these are indications for the employment of more or less stimulating remedies, the *ung. digestivum basilicum*, the oil of turpentine, decoction of oak bark, bark with tincture of myrrh, filling the cavity of the abscess with charpie, strong solution of nitrate of silver, with which is to be moistened the charpie laid in the cavity of the abscess But all these means are superfluous, the moist warm poultices are more effectual in raising the vital activity necessary for the secretion of good pus, the pus thereby more readily escapes, and the patient is saved from the troublesome and painful dressings by the sticking of the bandages. If the patient's strength fail and general weakness ensue, strengthening remedies, bark, rhatany, sweet flag, good nourishment, the enjoyment of pure air, and so on, are indicated

64 If the edges of the abscess-aperture unite, whilst the secretion of pus continues, they may be easily drawn asunder or separated with a probe Should the opening become too small, so that the pus cannot escape freely, it must be enlarged with the knife If the granulations are developed too strongly, the *proud flesh* (*Caro luxurians*, Lat., *Wucherndes Fleisch*, Germ.) must be touched with nitrate of silver and a compressing bandage applied, by which cicatrization is specially encouraged

65 When the pus does not escape properly, but collects in the abscess, (which may depend on the opening being too small or upon some peculiar situation of the abscess,) it sinks down in consequence of its own weight, or the little opposition which the loose cellular tissue in the interspaces of the part offers to it, or the suppurative process may extend with failure of the adhesive inflammation, and, on the other hand, an ulcerative absorption may favour the extension of the abscess, and form cavities or canals which are called *fistulous passages* (*sinus fistulosi*) These fistulous passages are often consequent on improper treatment, if the opening of the abscess be stopped by plugs, and so on, and the due flowing of the pus thereby prevented Under these circumstances a much larger quantity of pus escapes from the abscess than from its size

might be expected, especially if its neighbourhood be pressed in different directions, examination with the probe gives certain knowledge of its extent. If such fistulous passages remain long, their walls are overspread with a soft fungous membrane, similar to mucous membrane, which prevents the healing, and, when still longer continued, assumes a whitish, hard, callous condition

The membrane of the fistula first pointed out by HUNTER, has been well described by VILERME (*a*), LAENNEC, and BRESCHET (*b*)

[The passage in HUNTER here alluded to is the following — “When the parts are unsound, and of course the granulations formed upon them unsound, we have not this disposition for union, but a smooth surface is formed, somewhat similar to many natural internal surfaces of the body, and such as have no tendency to granulate, which continues to secrete a matter expressive of the sore which it lubricates, and in some measure prevents the union of the granulations I imagine, for instance, that the internal surface of a fistulous ulcer is in some degree similar to the inner surface of the urethra, when it is forming the discharge commonly called a gleet. Such sores have therefore no disposition in their granulations to unite, and nothing can produce a union between them but altering the disposition of these granulations by exciting a considerable inflammation, and probably ulceration, so as to form new granulations, and by these means give them a chance of falling into a sound state” (*p 480*)]

66 These fistulous passages may be generally avoided by the treatment already mentioned. If the fistulous passage be still recent, the free escape of the pus may be effected by a suitable enlarging of the opening, by the entire division of the fistulous passage, if it be superficial, or if the bottom of the passage be near the skin, by means of a counter opening, for the latter purpose a probe is introduced, with which the bottom of the passage and the skin above it are raised, and then the probe is to be cut upon. The further treatment is to be according to the preceding rules. In still longer continued fistulous passages, especially when their walls have become callous, we endeavour to excite a proper degree of inflammation of the walls of the passage, usually by the introduction of a seton, or of a bundle composed of many threads, which is tied together externally upon the fistulous passage, and daily drawn tighter (LANGENBECK) (*c*), or by the injection of irritating fluids (H DEWAR) (*d*), for instance, a solution of nitrate of silver, of bichloride, or nitrate of quicksilver, or by the introduction of a bougie, the point of which has been smeared with powdered nitrate of silver, (CRAMER) (*e*), (VON WALTHER) (*f*), and so on, and then, by a regulated pressure throughout its whole extent, to produce union of its walls. Where a satisfactory dilatation of the fistulous passage is possible, the cure may be effected without these painful remedies by the careful avoidance of any bandage which might interfere with the escape of the pus, and by close attention to the before-mentioned rules.

(*a*) In Journal de Medecine, par LE ROUX, July, 1815

(*b*) Dictionnaire des Sciences Medicales, vol viii p 206 Journal von GRAEFFE und WALTHER, vol ii part iv

(*c*) Von der Behandlung der Fistelgänge, der Schusskanäle und grosser Eiter absondernden Hohlen, in Neue Bibliothek für die Chirurgie und Ophthalmologie, vol i p 2 par 313

(*d*) On the Treatment of Sinous Ulcers, in Medico Chirurgical Transactions, vol vii p 487

(*e*) Beiträge zur Heilung der Fisteln und Geschwüre, in Heidelberger clinischen Annalen, vol x part i p 71

(*f*) Über Hohlgeschwüre und Fisteln, in Journal von GRAEFE und WALTHER, vol v p 1

According to LANGENBECK, the introduction of a ligature is, in many cases, preferable to incision, which oftentimes is impracticable without injuring large vessels, and so on. By the ligature inflammation is produced, the surface of the abscess becomes red and painful, the secretion of ichorous fluid is diminished, good consistent pus and near the ligature shooting healthy granulations are produced, and the skin becomes more firm and solid. As these symptoms come on, the ligature is to be gradually drawn tighter. In common cases, the ligature requires to be used only from four to eight days, to produce its effects. If it should be necessary to cut through the wall of the fistulous passage with the ligature, the remaining cavity must be filled with charpie.

67 During suppuration the practitioner must pay especial attention to the condition of the digestive organs, for impurities in the intestinal canal are frequently the cause of unhealthy pus, neither must pure healthy air be forgotten.

If the suppuration be continued on account of any dyscracy, the proper means for its counteraction must be employed.

On the treatment of abscess compare

VON KERN, Annalen der chirurgischen Klinik zu Wien, vol 1 1807, vol 11 1809.

VON WALTHER, über die topische Behandlung und über den Verband der eiternden Wunden, der Abscesse, Geschwüre und Fisteln, in Journal für Chirurgie und Augenheilkunde, vol IX part II.

68. The treatment of the Hardening into which inflammation has subsided has a double object, viz its dispersion or its removal with the knife. The resolution of the hardening is only possible when the lymph poured into the cellular tissue has not yet consolidated the walls of the part with each other, and its natural structure is not yet entirely lost, consequently, when the induration is still recent and not very hard. If there be also decided dyscracy, the curative treatment must be first directed to it.

For the resolution of hardening it is usual to employ the saponaria, the taraxacum, gramen, the gummi ammoniacum, galbanum, cicuta, belladonna, cherry-laurel water, various preparations of mercury and antimony, the soaps, alkalies, and so on for external use, warm bathing especially with or without alkalies, infliction of volatile salves, mercurial ointment, various plasters, the *empl de cicutâ c ammoniaco, de mercurio c camphorâ* and so on, fomentations of narcotic plants, electricity, and galvanism. The repeated application of leeches, the internal and external use of mercury, and iodine, the employment of derivative remedies, with a better regulated and rather strict mode of living, act most satisfactorily.

69 These means must be used with discretion, and not pursued too long, because, otherwise, the general health will be much disturbed, or inflammation and transition of the hardening into other kinds of disorganization, or even into cancer, may be produced. When, therefore, resolution is not effected, or when it cannot be attempted, it is most advisable to remove the hardened parts with the knife. If the patient will not submit to the operation, the hardening must be protected as much as possible from external influences, it must be kept warm, attention must be paid to the secretions and excretions, the patient must live regularly, and specially preserve himself from all depressing emotions of the mind.

70 Gangrene is always the loss of vital activity in some part, but the variety of its causes and of the circumstances connected with it render

very different kinds of treatment necessary, in order to stop the further spreading of the gangrene, to assist nature in throwing off the gangrenous part, and to prevent the operation of the gangrenous juices acting upon other parts of the body.

71 Gangrene may be specially connected with inflammatory, nervous, or gastric fever, with general debility or increased sensibility and convulsions.

When it is consequent on active inflammation and accompanied with inflammatory fever, which is specially the case in young strong persons after external injury and so on, a moderating antiphlogistic treatment can only be employed, and emollient poultices to hasten the throwing off the gangrene. If the gangrene arise from the confinement of the inflamed parts by unyielding aponeuroses, the removal of these mechanical hindrances, by suitably deep and extensive incisions, can alone prevent the production or further spreading of the gangrene.

In most cases the gangrene is connected with general debility, nervous or putrid fever, and then especially is indicated the use of bark with valerian, arnica, serpentaria, fluid hartshorn, diluted acids, naphtha, wine and so on if there be putrid symptoms, bark with mineral acids and alum. It must not be forgotten, however, that not unfrequently, under these circumstances, wine and animal food decidedly increase the febrile heat, the pulse becomes quicker, the tongue coated, and the patient very uneasy. A less irritating diet, and only so much mild, nourishing, and farinaceous food as the appetite requires and the stomach can bear, is then more proper.

Not unfrequently in gangrene there is a loaded state of the bowels, which must be as early as possible removed, and then the strengthening remedies employed. In greatly increased sensibility and convulsions, opium, musk, fluid alkalies, and other antispasmodic means are to be used.

72. The *Local Treatment* of gangrene has the two fold purpose of supporting nature in throwing off the slough and in diminishing the dangerous operation of the gangrenous juices.

If the gangrene be connected with active inflammation, softening, and in very severe pain, soothing poultices are to be used, but, if the gangrenous part be free from pain and shrivelled, stimulating remedies are required, in order to excite suppuration on the boundary of the slough, with which object it is most advisable to use warm aromatic poultices

The remedies which prevent the influence of the gangrenous juices, by absorbing or decomposing them, are quinine, oak or chestnut bark, camomile, vinegar, wine, brandy, camphor, hydrochlorate of ammonia, turpentine, diluted mineral acids, pyroligneous acid, carbonic acid, effervescent fluids, powdered charcoal. In moist gangrene, these substances are better used in powder, but in dry gangrene fomentations or poultices. In all cases the stench is best diminished by the employment of aromatic or simply moist warm poultices, and by suitable cleansing at each time of their renewal. It is still further lessened by the very useful strewing of powder, which, by its partial drying, often directly prevents the out-flowing of the gangrenous juices.

The operation of these remedies may be promoted by scarification or cutting into the gangrenous parts The scarifications must not, however

penetrate into the living part, or they will favour the action of the gangrenous juice, accelerate the increase of the gangrene and cause dangerous bleeding, their principal object must be *to prevent the collection of the gangrenous juices*. In the gangrene of old people (*gangræna senilis*) scarifications are always dangerous, so long as the toes are still attached at some parts, they must not be removed.

73 The sloughs having been thrown off by this treatment, the remaining wound must be managed according to the rules laid down for treating abscesses, and the vital activity of the patient must be supported by the suitable employment of bark and a nourishing strengthening diet.

74 In most cases nature, after the gangrene is defined, throws off the gangrenous part, and *amputation is not required*. Amputation is not applicable in gangrene depending on an internal cause which is still in operation, for, in such case, after the performance of amputation, gangrene again takes place in the wound. But when the gangrene has effected the whole thickness of a limb, and is defined, and the separation of the dead part cannot be expected, or, when produced by external violence, it is proceeding, but the cause of the gangrene can be removed with the gangrenous part, amputation is to be considered as necessary and likely to save life (1). It is, however, here to be borne in mind that gangrene in the deeper parts commonly makes further progress than the external appearance indicates. The amputation must always be performed in the healthy part.

(1) Such is the opinion of LARREY (a), but the opposite is especially supported by POTT.

When the gangrene remains stationary, the greatest danger is over. However desirable it may be to relieve the patient of the mortified part, yet in many cases is he unable to bear the shock of the operation. Here, then, in combination with a treatment suited to the diseased condition of the patient, it is more advisable, if the soft parts are divided down to the bone, to saw the latter through below the limits of the healthy part. Diseased condition of the remaining ulcerated surface, may at a subsequent period render amputation necessary.

[So far as my experience is concerned, I believe that amputation should on no account ever be performed, so long as the gangrene is in progress, whatever be its cause, for, if it be, the same action will be set up in the stump, and the patient's condition rendered worse by the shock of the operation. Only when the gangrene is proved to have stopped, by the line of separation having descended to some depth in the soft parts, is amputation to be entertained.—J F S.]

75 The treatment of *senile gangrene* must depend on the different modes in which it has arisen (par 26). When livid redness and swelling set in as a consequence of injury, or any other locally operating mischief, softening, soothing, or dry aromatic compositions must be applied, according to the circumstances, in more active inflammation, and in robust persons, leeches should be used. It is proper to allude to these cases, and especially when occurring in plethoric subjects, as DUPUYTREN (b), by the employment of the antiphlogistic method, by bleeding and leeching, professes to have met with successful results. The general treatment must correspond with the local, in very severe pain opium in considerable doses should be given (c), and, according to circumstances, with tonic medicines. In the other kind of senile gangrene, which

(a) Mémoires de chirurgie Militaire, vol in p 142

(b) In BALLING, as above

(c) POTT, Observations on Frostbite on the Toes and Feet, In his Surgical Works, vol in p 189 et seq Ed 1808

comes on with blackening and shrivelling of the part, tonic means in combination with volatile applications with the addition of opium if there be pain, and the local employment of soothing poultices, can alone produce the limiting and throwing off the slough, and respite life for some time

I have communicated (*a*) an interesting example of senile gangrene of the hand and fore arm, in a woman of eighty-two years of age, in which by proper support of the powers separation of the slough and healing ensued Compare also HEIM (*b*)

76 Gangrene from pressure by lying is to be guarded against by suitable preparation of the bed, by lying on a mattress instead of a feather-bed, by proper cleanliness, frequent change of the body-linen and sheets, repeated alteration of position, by putting doe-skin beneath the patient, by frequent washing the compressed parts with cold water, lead wash and camphorated spirit If the part have become red, it must be laid on a hollow formed by introduction of ring-shaped pads, little bolsters of horsehair, cleft mattresses, and afterwards compresses moistened with lead wash, vinegar, or THEDEN's arquebusade water must be applied, or the part must frequently be smeared with an ointment of white of egg and camphor beaten to a cream When ulcerative absorption has occurred, softening poultices, ointment of oxide of zinc, or of lead, with opium or camphor, should be applied, and, if the ulceration be spreading and deep, aromatic poultices If actual gangrene be present, then the ordinary treatment for gangrene must be employed Of course the treatment of the patient's health should be guided by the state of the disease

In many cases where it is difficult to move the patient, the application of local means may be assisted by the use of LECAT's suspending mat (*c*), or LEYDIG's (*d*) apparatus for raising invalids

[A machine, termed "An alleviator," for raising invalids has been invented by Mr Jenks, of Providence, Rhode Island, and is often used in this country It is composed of two upright posts about six feet high, supported each by a pedestal—of two horizontal bars, at the top, rather longer than a common bedstead—of a windlass of the same length placed six inches below the upper bar—of a cog-wheel and handle—of linen belts, from six to twelve inches wide—of straps secured at one end of the windlass, and at the other having hooks attached to corresponding eyes in the linen belts and of a head piece made of netting The patient lying on his mattress, the surgeon, or attendant, will only find it requisite to pass the linen belts beneath his body, (attaching them to the hooks on the ends of the straps, and adjusting the whole at the proper distance and length, so as to balance the body exactly,) and raise it from the mattress by turning the handle of the windlass To lower the patient again, and replace him on the mattress the windlass must be reversed —G W N]

77 In gangrene after the use of cockspurred rye, vomiting and purging must be had recourse to, and subsequently both internal and external stimulating remedies In many cases amputation has been performed, which, however, has not always been of service, because,

(*a*) Heidelberger klin Annalen, vol vi. (*c*) Philosoph Trans 1742, p 346
part 1 (*d*) Der Krankenheber, &c, mit 2 Kupf
(*b*) Schweiz Zeitschr fur Naturw u Heilk Mainz, 1812
vol ii part i p 73

especially in patients who had been much weakened, the same changes took place in the stump. If the gangrene has become defined, it is most advisable to leave the separation of the parts to nature and saw off the bone.

Full reports of observations on this subject are to be found in THOMSON (*a*) and in SAMUEL COOPER (*b*).

78. The treatment of *malignant pustule* varies according to the accompanying symptoms. The local treatment consists in cutting out the pustule by a circular incision, and afterwards cauterizing the edges of the wound with nitrate of silver or sulphuric acid, (also with the actual cauterium,) and placing upon it charpie moistened with oxymuriatic acid. The slough is to be covered with a softening bran poultice, and, after it is thrown off, the treatment of the wound is to be simple. If the pustule be not deep, but the slough much outspread, it is proper to make deep sanguifications and employ the remedies just mentioned. If general symptoms are not present, it is only necessary to use sulphuric acid or HALLER's acid mixed as a drink. If there be indications of gastric impurities, emetics must be employed in divided but sufficiently effectual doses, and, if they do not operate, purging, or vinegar clysters must be used. If the powers sink and nervous symptoms appear, strengthening and stimulating medicines are required, bark, serpentaria, arnica, valerian with elixir of vitriol, hydrochloric acid, and so on. But bleeding is rarely required, unless in decided plethora and great determination of blood to the head and chest.

On malignant pustule, see

LARREY, as above, vol i p 52

HUFELAND's Journal, vol li part v, vol. liv part iii, vol lvi part iv

RUST's Magazine, vol xv part i, vol xvi part iii, vol xvii

J N HOFFMANN, der Milzbrand, oder contagiose Carbunkel der Menschen, mit Berücksichtigung einiger damit zu verwechselnder Krankheitsformen und einer fragmentarischen Uebersicht des bei den Thieren herrschenden Milzbrandes Stuttgart, 1827 8vo

RASEDOW, die schwarze Pocke, in Journal von VON GRAEFE, u VON WALTHER, vol vii p 185, vol xii p 549

SCHROEDER, über die schwarze Blätter, in RUST's Magazin, vol xxix part ii

WEMDROTH, über die Ursachen, Erkenntniß und Behandlung des contagiosen Carbunkels Sangerhausen, 1838

79. It is apparent, from the nature of the causes of *hospital gangrene*, already mentioned, in what way this dangerous complication of wounds and ulcers can be guarded against. Care must be taken as much as possible for purity of air and proper diet with a moderate use of wine, the greatest cleanliness of the bandages must be observed, the wound must be washed with a light aromatic infusion or with diluted alkaline solutions, and symptoms of gastric impurity must be removed by vomiting and purging. Emetics are especially advised by POUTEAU, DUSSAUVOY, and others, as the most important remedies at the beginning of the disease. They recommend them as being of themselves capable of stopping the advance of the disease.

If the peculiar changes occur in the wound or in the sore, (*par* 35,) washing the whole surface with good vinegar, after thoroughly cleansing with charpie, and frequently moistening the bandage with vinegar, is

often sufficient at the onset to restore the wounds in a few days to their former condition. For the same purpose also is the solution of arsenic recommended. If the surface of the wound do not improve in appearance, its entire extent should be touched with nitrate of silver, or conical pieces of caustic laid in the viscid mass. But, under these circumstances, the most important remedy is the free application of the actual cautery to the whole surface of the ulcerated part. The slough is to be covered with powdered bark and turpentine or some stimulating salve, and when the slough has separated, the appearance of the wound must determine whether the application of the cautery is to be repeated or not. Besides these means, the following may also be recommended, decoction of bark, diluted mineral acids, especially hydrochloric acid, yeast poultices, spirituous lotions, brandy and myrrh, aloes and camphor, hydrochlorate of ammonia with water and vinegar, *sps terebinth*, *ung styrac* and *Egyptiacum*, balsam of copaiva, solutions of bichloride of mercury and nitrate of silver, butyr of antimony, pyroligneous acid, lemon juice and so on.

80 General treatment, suited to the different condition of the patient, must also be connected with this local treatment. At the onset, if symptoms of irritation and active febrile excitement are present, acid drinks, especially dilute mineral acids, are serviceable, in impurities of the stomach, emetics, in great weakness, bark, and other tonic remedies, only in rare cases is a strict antiphlogistic plan of treatment called for. The diet must of course correspond with the general treatment, and care should be taken for purity of air and keeping the patient apart from others.

On hospital gangrene, compare

POUTEAU, *Oeuvres Posthumes*, vol III 1783 8vo

GILLESPIE, LEON, Observations on the Putrid Ulcer, in London Medical Journal vol VI p 373 1785

DUSSAUSSOY, Sur la Gangrène des Hôpitaux Genève, 1787 8vo

BLANE, G , M D , gives an account of this gangrene, by the name of Malignant Ulcer, in his Diseases of Seamen, p 502, 3d Edit , London, 1799

TROTTER, M D , describes it by the same title in his Medicina Nautica, vol II p 170, vol III p 467

BELL, JOHN, Principles of Surgery, vol I p 136

LESLIE, De Gangræni Contagiosa Edinburgh, 1805

JOHNSON, CHARLES, M D , de Gangræni Contagiosa Nosocomiale Edinburgh, 1805

THOMSON, JOHN, in his Lectures on Inflammation, p 456

RENARD, über den Hospitalbrand Mairz, 1815 8vo

GERSON, über den Hospitalbrand, nach eigenen Erfahrungen Hamburg, 1817

8vo

H BLACKADDER, Observations on Phagedæna Gangrænosa Edinburgh, 1818

8vo

W. WERNECK, kurzegefasste Beiträge zur Kenntniss der Natur, der Entstehung, der Verhutung und Heilung des Hospitalbrandes Salzburg, 1820 Large 8vo

BRAUER, Observaciones quædam de Gangræni Nosocomiali, quæ anno hujus sæculi

xiv Lipsiæ inter milites variarum nationum grassata est Lipsiæ, 1820

ALEXANDER, über den Hospitalbrand, in Hippocrates Magazin von SANDER und

WAEPTER, vol V p 1—220

DELPECH, Clinique Chirurgicale de Montpellier, vol I p 78

BOGGIE, in the Transactions of the Medico-Chirurgical Society of Edinburgh, vol III p 1 1828

OLLIVIER, A F , Traité expérimental du Typhus Traumatique, Gangrène ou Pourriture des hôpitaux. Paris, 1822 8vo

SECOND SECTION —OF CERTAIN PECULIAR KINDS OF INFLAMMATION

I—OF ERYSIPelas

RICHTER, G G , Diss de Erysipelite Goeting, 1744 4to
 THIERENS, A L , Diss de Erysipelite Lugd Batav , 1790
 WINKEL, L H O , Aphorismi de cognoscendo et curando Erysipelite Erlang ,
 1794 8vo
 FERNE, W C S , Diss de diversâ Erysipelatis naturâ Franc ad Viadr , 1795.
 4to
 DESAULT, Observations sur Diverses Espèces d'Erysipèles , in Journal de Chirurgie, vol ii p 13 1791
 RUST, das Pseudo-Erysipelas, eine noch nicht hinreichend erkannte Krankheitsform , in his Magazin, vol viii part iii p 498
 HUTCHINSON, A C , Practical Observations on Surgery 2d Edit London, 1826
 chap ii
 PAULI, über Phlegmone telæ cellulosaæ , in Rust's Magazin, vol xxvii p 129
 LAWRENCE, WILLIAM, Observations on the Nature and Treatment of Erysipelas , in Medico-Chirurg Trans vol xiv part i p 1
 DUPUYTREN, Du Phlegmon Diffus , in Leçons Orales, vol ii p 289
 FENGER, C E , Diss de Erysipelite ambulanti Haoniæ, 1842.

81 Under the terms *Erysipelas*, *St Anthony's Fire*, *Rosa*, *Erysipelas*, Lat , *Rose* oder *Rothlauf*, Germ , *Erysipèle*, Fr , is usually understood an inflammation of the lymphatic vascular network overspreading the surface of the cutis, in which, not unfrequently, the skin glands, and Malpighian mucous net, but more rarely the cellular tissue and muscles lying beneath, participate Under this general notion are included a number of diseased conditions which are considered as modifications of erysipelas, but in their nature are entirely different from it Rust has the merit of having pointed out their special points of difference, and recognises a *True Erysipelas* (*Erysipelas verum* seu *exanthematicum*, Lat , *acte Rose*, Germ) and a *False Erysipelas* (*Erysipelas spurium* seu *Pseudo-Erysipelas*, Lat , *unachte Rose*, Germ)

[HUNTER long since observed, that "most inflammations that are not of the true adhesive and suppurative kinds are called erysipelatous, although, probably, they do not in the least belong to it " (p 269) And CHELIUS has echoed him in the above observation, that "a number of diseased conditions, which are considered as modifications of erysipelas, in their nature are entirely different from it " But he has not at all, by his arrangement, mended the matter, and I have, therefore, pointed out, first, the different applications of the terms erysipelas and erythema, which are employed by him very contrarily to our ordinary usage of them , and, afterwards, I have shown that one of his forms of erythema is really that important disease, inflammation of the cellular tissue, which, by other writers as well as by him, is confounded with inflammation of the skin, and often mentioned as gangrenous erysipelas It is, however, right to observe that our author has, at the end of paragraph 83, shewn that he is not unaware of the impropriety of considering this disease as an affection of the skin —J F S]

82 The *True Erysipelas* appears without any local disposition to disease, but with previous general indisposition, which is usually shown by weakness and heaviness of the limbs, listlessness, pain in the region of the stomach, loaded tongue, nasty taste in the mouth, disposition to

vomit, more or less active fever, head-ache, wandering, lethargy, or madness,—as a pale uncircumscribed redness of the skin, fading into yellowish, which spreads unequally, is shaded off towards the edge, disappears on pressure with the finger, but returns when the pressure is removed. After the appearance of the erysipelas the fever generally diminishes or disappears, but every fresh attack is accompanied with fever. The seat of this erysipelas never extends beyond the lymphatic-vascular net overspreading the surface of the cutis. The severity of the disease is as various as is the condition of the part first attacked, it however, usually subsides under critical discharges of perspiration and urine, and with scaling of the skin, it never runs into suppuration, but only, with weakly constitutions and other concurrent circumstances, into ulceration and gangrene, in consequence of which the destruction of the surface of the body extends to the parts beneath, and there ensues, not a bounded fluctuating abscess, but an open, wide-spreading, putrid, ulcerating surface. If the scaling of the skin, critically following the erysipelas, be disturbed by moist remedies, by cold and so on, drop-sical swelling ensues. This erysipelas is very fugitive, it subsides of itself, but more commonly after the external use of moist remedies, of cold, or on mental emotions, and so on, it suddenly quits the surface, and causes inflammation of the brain, chest, or belly, madness, convulsions, paralysis, and so on. The true causes of this erysipelas are biliary irritation, disturbance of the functions of the liver, collections of gastric impurities, use of indigestible food, obstruction in the portal system, and a prevalence of peculiar atmosphere and temperature, in consequence of which it seems to be commonly epidemic, especially towards autumn and during summer.

Compare BALLING, das Akklimatisations-Erysipelas, in Heidelberg Klinischen Annalen, vol vii p 176

The Vesicular Erysipelas (*Erysipelas vesiculae, bullorum*) is a variety of this kind of erysipelas, in which either at the onset, or in the course of the disease, vesicles of various size arise, sometimes like a miliary eruption, sometimes like peas or hens' eggs, which often run together, and, after bursting, form crusts, or, frequently, spreading sores.

(1) The disease here described as true erysipelas by CHELIUS, is the *erythema* of English practitioners, and which has been well described by WILLAN (a) as "a nearly continuous redness of some portion of the skin, attended with disorder of the constitution, but not contagious" (p 472,) and BATEMAN (b) observes, that "it differs from erysipelas inasmuch as it is a mere rash or efflorescence, and is not accompanied by any swelling, vesication, or regular fever" (p 119.) RATER (c) speaks of it as a superficial inflammation of the skin, characterized by morbid redness and heat, and the absence, for the most part, of papulae, vesicles and pustules (vol 1 p 98.) Elsewhere he observes, that "it is the first stage of a number of cutaneous affections, but when permanent it constitutes a disease in itself" (p 95.)

The vesicular erysipelas, which CHELIUS considers merely as a variety of his erysipelas, is a distinct and definite disease, the acute erysipelas of WILLAN and BATEMAN, which "most frequently occurs in the face, affecting usually one side of it only, sometimes it seizes one of the extremities, and in both cases it is ushered in by a smart feverish attack. The colour is higher than in the other species of the disease, and the burning heat and tingling in the part are exceedingly distressing. The swelling generally appears on the second night or third day of the fever, the vesiculations rise on the fourth and fifth, and break or subside on the fifth or sixth,

(a) On Cutaneous Diseases Lond, 1808 4to

(b) A Practical Synopsis of Cutaneous Diseases according to the arrangement of Dr WILLAN London, 1819 8vo 15th Edition

(c) Traité Théorique et Pratique des Maladies de la Peau Paris, 1826 2 vols. 8vo

when the redness changes to a yellowish hue, and the swelling and fever begin to diminish, and on the eighth day both disappear, on the tenth the new cuticle is commonly left exposed, the old one having separated, and the brownish or dark scab, which had formed where the fluid of the vesications had been discharged, having fallen off." The disease runs its course more quickly in the young than in those of more advanced age, and "the vesications, in the latter instances, are often succeeded by a profuse discharge of acrimonious lymph for several days, so that scabs do not form. Suppuration very rarely occurs in this species of erysipelas, especially when it affects the face" (pp 126, 7)

From this description it is quite evident that CHELIUS is incorrect in making his vesicular erysipelas a variety of his true erysipelas, the latter being really erythema, and therefore an exanthematous disease, whilst the former, which is our acute erysipelas, is a bullous disease. It was necessary also to make these observations to prevent the confusion which would otherwise arise from the acceptation in which CHELIUS uses the terms erysipelas and erythema, differing so entirely from that in which they are employed by English writers —J F S]

83 The *Spurious Erysipelas* or *Pseudo-Erysipelas* is a continual inflammation of the skin with some redness, (*Erythema*), which has nothing in common with the true erysipelas but its external appearance, and is produced by any pretty strong irritation of the skin. Influences of this kind are, scorching by the sun, slight burning, cold, irritating ointments and plasters, cantharides, mustard plaster, horse-radish, the juice of toxicodendron, hard rubbing, wounds and injuries of all kinds, stagnant humours, swellings, hardenings, and so on. Hence inflammation of the skin is produced, either directly or indirectly, in the first case appearing immediately, in the second as a consequence of some other disease, which has been excited by inflammation. The inflammation of the skin, thus produced, is either superficial, or it penetrates deeper into the substance of the skin. The former is more like erysipelas, but the latter has rather the character of phlegmonous inflammation, and the more the cellular membrane and muscles are attacked by it, so much the less does the disease deserve the name of inflammation of the skin.

84 According to its various causes, *Pseudo-Erysipelas* is divided into two kinds —

First The *Erythema idiopathicum*, which is merely a consequence of external irritation (from cold, heat, corrosive substances, slight injuries, and so on)

[A very frequent form of idiopathic erythema is that caused by friction, and commonly known as *Intertrigo*, which is well exemplified in the chafing of the skin in fat persons, often also noticed in the folds of the skin of the neck, groin and hams, and behind the ears of infants, and resulting from inattention to cleanliness, the moisture and sebaceous secretions which are left on the delicate skin of these parts irritating it, so that often the character of the perspiration is changed to clamminess, and its quantity increased, and, where it can dry, superficial thin scabs are formed, even before excoriation of the skin occurs, which soon takes place, and, if left alone, runs on to gangrene. Erythema may also originate from the flow of other natural secretions over the skin, as the spittle over the chin and neck, if the lower lip be imperfect, or do not retain its proper place, the urine, in incontinence or in perineal fistula, the tears over the cheek, and so also the increased and altered mucous discharge from the nostrils during catarrhi, will cause severe erythema of the upper lip —J F S]

Second The *Erythema symptomaticum, consensuale*, which is the simple reflection of another disease of the structures lying deeper beneath the skin. This other disease may be,

A. An inflammatory or serous distention of the tendinous expansions,

and aponeuroses, with the intensity of which the accompanying inflammation of the skin increases, and oftentimes spreads very far, as, for instance, in œdema, in injuries of the head, in whitlow, and so on.

[This is the "erysipelatous inflammation" which, HUNTER says, "often arises from accident, but then it is commonly a secondary inflammation, although not always, for, the first shall have gone off, and, when the suppuration was to take place, it shall have come kindly on, but afterwards the erysipelatous shall take place * * * It is more commonly a cutaneous inflammation than situated in the deeper-seated parts, although, in some constitutions, every inflammation, wherever it exists, will most probably be of this kind, however, the skin appears to be most susceptible of it, because it will spread over a prodigious surface of skin, while it does not affect even the cellular membrane underneath * * * It is more common in the summer than in the winter, more especially in hospitals, and, I think, takes place oftener after wounds on the head than any other I have often seen it begin round a wound on the scalp, extending itself over the whole head and face, the eyelids being very much swelled, the ears thickened, and it has advanced to the neck, shoulders and body, creeping along both arms, and terminating at the fingers' ends that which attacks the body, often goes along the body to both thighs, down the legs, and terminates at the ends of the toes, and, while this is going on, it is as expeditiously cured behind, and the skin peels off the cured parts however, this is not always the case, it often stops, and where it proceeds so far, it is commonly becoming milder" (pp 270, 1)]

The form of the disease just described by HUNTER, is the *erratic erysipelas* of WILLAN and BATEMAN It, however, more commonly occurs on the limbs and body, than on the head, and frequently accompanies punctured wounds, or poisoned wounds in dissection In the latter cases, it is often extremely troublesome, and continues for weeks, making its appearance in the neighbourhood of the wound, after the more severe symptoms, either without or with suppuration and sloughing, have subsided, and the patient seems nearly convalescent it will run up and down finger after finger, consecutively, and I have known the fingers thus affected twice or thrice during the same attack.

That form of the disease which sometimes follows scalp-wounds is rather the *edematous erysipelas* of WILLAN and BATEMAN than the erratic It is described by those writers "of a paler red, or of a yellowish-brown colour, is accompanied by less heat and local distress" than true, or even erratic erysipelas, "its surface is smooth and shining, and, if it be strongly pressed with the finger, a slight pit remains for a short time" The scalp swells enormously, and the disease spreads more or less slowly and extensively, till "the whole face is much enlarged, so that the form of the features is scarcely recognised, and the appearance is not unaptly compared by WILLAN to that of a bladder distended with water" (p 127) Generally, as far as I have observed, this edematous erysipelas is not accompanied with vesication —J F S]

B A metastatic deposit in the cellular tissue, periosteum, and glands, in gastric, rheumatic, arthritic, and puerperal diseases In such cases, when the masses deposited are fluid, the parts attacked quickly die, and are given up to the ulcerative process Often, within a few hours, in a previously healthy part, (mostly of the thigh or leg, especially on the right side in persons advanced in years,) a redness of the skin comes on with fluctuation and diffused pain, in which, after opening the abscess, whole sheets of dead cellular tissue may be withdrawn, and, if the periosteum be involved, the bone may be felt bare Usually, however, its course is not so quick, the local pain is preceded by more or less severe shiverings, which from their repeated accessions, resemble an ague The fever continuing, the skin is rosy red at the painful parts, and somewhat œdematosus, so that it retains the impression of the finger The fever becomes more active, the swelling harder, the redness bluish, the skin grows shining and blisters, the cellular tissue is hard and firm,

the urinary and fecal discharges are changed and suppressed, with accompanying restlessness, and great agitation. At this point the disease seems to stand still, the heat, tension, and pain are unaltered, the vesicles have the same appearance. If at this time the skin and cellular tissue be cut into, a quantity of whitish fluid with a little pus escapes, a few days after, less of the thin fluid, and more pus, and still later, a whitish lard-like substance, and upon pressure only a very little pus, the cellular tissue is dead. When it has gone thus far, the skin is destroyed, the vesicles burst, a whitish ichorous fluid is discharged, whitish or blackish spots appear which quickly spread, the cellular tissue is thrown off in large patches, the skin is entirely separated from the underlying parts, all the connecting cellular tissue between the muscles is destroyed, the skin becomes gangrenous, the suppuration is very plentiful and offensive, the destruction spreads and exhaustion follows with copious sweats, purging, and so on. If the patient's powers revive, and the disease be arrested, the formation of granulations and cicatrization is always very tedious, on account of the great destruction of the cellular tissue (1). If the masses deposited be solid, they sink into the substance of the cellular tissue, inflame and harden it, and destroy its vital relations, without causing actual death. This degeneration frequently does not occur until after several weeks, and appears with accompanying redness of the skin and with a somewhat painful, far-spread, deep-seated hardening (2). The termination of this disease (which KLUGE has commonly observed in the serotum, and which I have seen upon the hand and fore arm) is either a tedious resolution with gradual subsidence of the redness and hardness, or death of the degenerated organ, in which the size of the part is increased, the previous hardness becomes doughy, fluctuation takes place, and the above-described destruction and *ichor*-ousness ensues (a).

[1] This is the *inflammation of the cellular tissue*, to which I slightly adverted at p 72, and, although very commonly confused with erysipelas, or, as by CHELIUS, with erythema, it is decidedly different from either, although both occasionally run into it. JOHN HUNTER was well acquainted with it, as will be presently seen, though he included it with erythema, under the common title *erysipelatus inflammation*, which he does not describe at all. He says—"The erysipelatus inflammation is very peculiar, and most inflammations that are not of the true adhesive and suppurative kind are called so, although probably they do not in the least belong to it, and this may arise more from the want of terms, than the want of discrimination" (p 269). After describing erythema, which it is quite certain he means, restricting it to the skin, he proceeds—"When it (the inflammation) goes deeper than the skin into the cellular membrane, it often suppurates, but then I suspect it is not the true erysipelatus, for, in such cases, it commonly produces mortification in the cells, by which air is let loose, this gives a strange feel, neither of fluctuation nor crepitation, and, as there are no adhesions, the matter finds an easy passage into the common cellular membrane, increasing the same kind of suppuration wherever it comes, and, as mortification is a consequence of these inflammations, putrefaction ensues, and the discharge becomes very offensive * * * * When it produces suppuration in the cellular membrane it is often dangerous, both from the disease itself and the consequences of the matter diffusing itself much farther * * * * The sores seldom ulcerate, they should be opened early, or the matter either gets into the cellular membrane from the want of adhesions, or it separates parts that are only attached, as the periosteum from the bone, muscles from muscles, etc. Whereas the true suppurative ulcerates briskly, which therefore should not be opened early, but allowed to burst" (pp 271, 2)

(a) KLUGE, in RUST, as above, p 525

So far as it goes, HUNTER has well described this disease, but he speaks of it as if invariably consequent on erythema, which is more rare than its following erysipelas, which he does not mention at all. It is perfectly true that, from both these diseases, the inflammatory action may descend, and attack the cellular tissue, but very commonly the inflammation begins in that tissue, and the redness of the skin is only secondary, and symptomatic of the mischief going on beneath.

Inflammation of the cellular tissue arises frequently without any apparent cause, but sometimes follows a graze or slight wound or contusion of the skin. It commences with swelling, tension and dusky redness of the limb, (almost invariably attacking the extremities,) is very painful, and has a doughy feel, it spreads very rapidly, downwards as well as upwards, if it have commenced on the upper or on the middle of the lower member of the limb. The pain and tension increase, the redness becomes darker, and, if not interfered with, large patches of the skin assume a gangrenous character, sometimes accompanied with large vesications loaded with dirty serum, but very often without them. Pressure upon the skin not unfrequently gives a crackling sensation. The gangrene of the skin continues spreading, and, generally, in the course of forty-eight hours or less, the greater part, or the whole, of the skin is sloughy. If there be sufficient power, ulceration takes place at the edge of one or other slough, and a little ichorous exudation is observed, which subsequently is followed by fetid pus, and sloughs begin to separate, simultaneously with which the character and quantity of suppuration are improved and increased, till the whole of the dead parts are thrown off, but this is a result which can scarcely be expected, for the patient is generally worn out before this can take place. The constitutional symptoms in this disease are at first those of great excitement and general disturbance, the skin burning hot and dry, the pulse quick and full, the alvine secretion unhealthy and the tongue dry, the patient becomes restless, soon wanders, becomes delirious, often violently, and then drops into a typhoid state, in which condition he speedily sinks. The disease is easily distinguishable from erysipelas, by the absence of vesication at the onset, and by its darker redness, also by its usually occurring in the limbs. But, as I have already mentioned, erysipelas may subside into it, as it not unfrequently does when attacking the scalp, and occasionally also when the face is affected, specially when the regions of the orbits are concerned, in which cases I have seen some very fearful sloughing of the cellular tissue in those cavities.

The disease generally attacks adults, and more especially persons accustomed to large quantities of beer and spirits, and gross feeding. In such persons the disease often seems to occur spontaneously, and at other times from the slightest cause, as a mere scratch. But I do not agree with CHELIUS that metastasis is generally, if ever, the cause of the disease.—J F S]

(2) I have once or twice seen this degeneration in the scrotum, and I think I have noticed it occasionally in the legs of people addicted to drinking, in whom it seems to have been a commixture of adhesive deposit with the serum of œdema. But, many years ago, I had under my care a woman, between twenty and thirty years of age, whose face was thus affected, consequent on repeated attacks of erysipelas previous to my seeing her. Her forehead, and face especially, were considerably swollen and fiery red, having the appearance of skin distended with œdema, and threatening to burst, but it had not any such disposition. When pressed, it was found firm and but little yielding. She did not suffer pain in any material degree, but was principally inconvenienced by both eyelids being included in the disease, and so swollen that their apertures were little more than narrow horizontal slits, so that without bowing her head much forwards she could see nothing immediately below her for a considerable distance. All sorts of constitutional and local remedies having been employed without avail, it was proposed to her that some slices (they could only so be properly called) should be taken out of the swollen eyelids. To this she readily assented, being anxious for the slightest chance of relief, and, performing an operation similar to that for entropium, I removed a horizontal slice from between each tarsus and the corresponding edge of the orbit of both eyes, digging down to the bone, to the depth of half an inch, and cutting through cellular tissue literally converted into brawn, the gaping edges were then brought together, and, at first, she seemed a little benefited, but the wounds soon healed, and no advantage was derived. In a second operation, I removed some short vertical slices from the lower lids, but not with much immediate advantage. I have constantly seen her up

to the present time, and, probably from the contraction of the scars, the apertures of the lids are increased but are still small The face is also somewhat less, but it is still very full and deformed —J F S]

GULLIVER (*a*) mentions two peculiar affections of the cellular tissue which he has observed, and which he believes by no means uncommon among soldiers on service, who frequently "complain of inability to sustain the fatigue of marching, in consequence of swelling and pain in the feet and ankles, produced by this exercise In many instances the cause of the affection is very obscure, and in some it may probably be ascribed to simulation, but I have seen cases in which the complaint was evidently connected with a change of structure in the subcutaneous cellular membrane of the legs, generally presenting itself in one of two forms

"In the first and most numerous class of cases, after the patient has been long subjected to the inconvenience of swelling around the ankles and back of the feet, the disease assumes a more inveterate character,—that of thickening and induration of the subcutaneous cellular texture, so as to leave no farther doubt of the incapacity of the man for active service In one instance, in which the disease attacked the right leg, the part was constantly bedewed with perspiration, emitting a peculiarly offensive odour The affection sometimes occurs in both extremities, and frequently in one only

"In the second description of cases, although the soldier assigns the same cause of disability as in the preceding, the anatomical character of the disease offers a marked difference There appear simply to be induration and rigidity, without thickening of the subcutaneous cellular substance I know of no specific term by which it could be appropriately designated The lower part of the leg, and frequently the back of the foot, appears hide-bound, the limb feeling hard and smooth, from loss of extensibility in the filamentous web, which no longer possesses that yielding looseness necessary to the due performance of its functions, so that the smallest fold of the skin cannot be grasped between the thumb and finger The affection is unattended by swelling, except incidentally from unusual exertion The examples which have come to my knowledge have been invariably confined to one extremity * * * Of the first, which, in its advanced stage, may be considered as a species of compact œdema, we find no account in the accurate Treatise of Dr CRAIGIE, and only a doubtful notice by Dr OTTO, of the second, I am unaware of any description" (p 309) "The chronic induration and thickening of the cellular substance may probably arise from a variety of causes, of which repeated attacks of erysipelas appear to be one, but the first two cases described in this paper, as well as others which I have seen, were not preceded by inflammatory symptoms Nor was there any swelling or pain in the tract of the absorbing vessels" * * * It would appear merely conjectural to refer the affection to a change in the veins, but the following circumstances are worthy of remark in connexion with the subject,—viz, the examples of phlegmasia dolens, from inflamed veins, of œdema of the lower extremities, from the accumulation of clots in the veins of the limb, without their obvious inflammation, and of chronic œdema from the irregular congestion of the capillaries, without any discoverable alteration of the venous trunks during life

"But we have no reason to suppose that the induration without thickening of the cellular substance is dependent on any change in the veins, and until the precise anatomical character of the disease has been shown by dissection, the descriptive appellation should be admitted with reserve From the unaltered size of the limb, it is difficult to ascribe the hide-bound condition of the part either to hypertrophy or atrophy of the cellular substance, for which reason it appears most probable that the affection is simply an induration or rigidity of this texture,—an effect probably of very slow inflammatory action, sometimes arising from local injury, and not unfrequently without any assignable cause" (pp 311, 12)

This latter form is very curious, and I believe entirely undescribed, nor does it readily admit of solution The former kind seems to me very similar to the brawny condition above mentioned —J F S]

85 *Symptomatic pseudo-erysipelas* is distinguished from the *idropathic* or *common* inflammation of the skin produced by irritation, the inflammatory redness is not so distinctly spread, at some little spots it is more intense,

(a) Remarks on certain Affections of the Cellular Tissue of the Legs, in Edinburgh Medical and Surgical Journal, vol xlvi 1836

here and there inclining to violet, the affected part is less hot, more doughy, sometimes also hard and knotty, and often at the very beginning of the disease, distinctly fluctuating to the touch. The patient does not complain of such burning, but of a gnawing or beating pain, not proportioned to the degree of inflammation, and situated deeply in the limb. The swelling also bears no proportion to the degree of inflammation, but is in direct relation to the pain. Painful and knotty hardening of the skin frequently precedes its inflammation. When the inflammation has taken place, it always spreads farther, usually, however, more slow than quick, creeping, as it were, towards the affected parts. The ordinary means of resolution are of little use, in most cases, the disease is chronic, and single spots are often observed, which suddenly become more sunken, more or less distinctly fluctuating, mortified or destroyed in some way or other. All the external causes which could have given rise to ordinary inflammation of the skin are deficient also at the beginning of the disease.

86 The etiology of pseudo-erysipelas is clear from what has been already said of its several kinds. In reference to the necrotic hardening of the cellular tissue, which is the most usual cause of pseudo-erysipelas, it must be remarked that, although its origin is in many cases obscure, yet a peculiar state of atmosphere, specially the operation of severe cold and a certain change of temperature, must contribute much to it. Hence this disease occurs more frequently in winter and in the coldest months, than at any other time of the year, more frequently in weakly people and on the lower limbs, more commonly in advanced age and in the male sex.

87 The *Treatment* of simple erysipelas requires especially action on the biliary and cutaneous systems. Emetics have generally here the best effect if employed early, and cannot be replaced by purgatives. If after their operation the fever continue, cooling acid purgatives with suitable antiphlogistic diet must be employed. Not until the fever has entirely or for the most part subsided and no farther indication for depletory remedies exists, can sudorifics alone be relied on. Only if the erysipelas, especially on the face, be accompanied with high inflammatory fever, the head thereby attacked, the erysipelatous parts swollen, burning, and painful, accompanied with confusion and determination of blood to the head, should blood-letting or bleeding with leeches behind the ears be employed before the use of emetics, and at the same time the blood should be withdrawn from the head by warm foot-bathing, mustard poultices upon the calves of the legs, and so on. It is always, however, to be remembered, that erysipelas, even when connected with inflammatory fever, will not bear the same active antiphlogistic treatment as other inflammations, and is specially prone to return after any exhaustion.

[Two very different plans of constitutionally treating erysipelas are employed in this country, and, curious as it may appear to be, with success. The old method, still largely practised, is that on the antiphlogistic plan, first clearing the bowels, and then employing salines and antimonials, and, when the inflammatory action has subsided, administering gentle tonics, as tincture of calumba and the like. This treatment, which formerly I have seen constantly practised, and to which I have been personally, often in my youth, subjected, was generally very successful, and is, by many practitioners, still considered the best. The second mode is directly the reverse, and was, I believe, first introduced, fifteen or twenty years since, by my

friend and colleague, Dr WILLIAMS. It consists in the entire reliance on wine (port wine usually) given often to the amount of eight and twelve ounces a day, varying according to the age and condition of the patient's constitution, but without any consideration of the stage of the disease. And this practice has certainly been very successful, and is at our hospital now almost invariably followed. I prefer, if the case come under my care early, besides administering a dose of calomel and rhubarb, (which should never, under any circumstances, be omitted,) to give some saline and antimonial for twenty-four hours, rarely beyond that time do I defer giving the wine, the effect of which in checking the progress of the erysipelas is, generally, soon very decided. Bleeding, either from the arm or by leeches from the head, is, I believe, very unadvisable. The disease almost invariably occurs in constitutions without power, and therefore bleeding favours rather than diminishes it.—J F S]

88 The *Local Treatment* of true erysipelas has no other object than to defend the diseased part against external injury, which may be effected by the use of dry warmth, by bags of camomile and elder flowers, by warm flannels, and so on. All moist, especially wet or greasy remedies, are injurious, as they repel the erysipelas, or produce oedematous swelling of the part. If, after the fever and swelling have for the most part ceased, there remains an oedematous, colourless swelling, the herb bag must be smeared with camphor, or the swelling covered with green-oil cloth, and swathing of the part made use of. According to RUST, only the vesicular erysipelas and its varieties, especially if they exhibit a more chronic than acute course, require the application of moist warmth in a proper vehicle, for which purpose GOURLARD's lead wash with a small addition of laudanum is best. If the erysipelas run into ulceration or gangrene, attention must be paid to giving free escape to the ichor, the general and local treatment must be regulated, as before mentioned, according to the character of the fever, and the rules given in reference to abscess and gangrene, and clearance of the bowels, must be especially remembered.

[The local treatment of erysipelas is very simple, warm or cold washes, as may be most agreeable to the patient's feelings, consisting of water with a little spirits of wine, are best, and I think preferable to either warm or cold lead wash, which renders the cuticle harsh and unyielding.

If there be much tension of the skin, the practice recommended by DOBSON of making a dozen or twenty punctures with the point of a lancet is very beneficial, and agreeably relieves the hide-bound sensation which the patient feels.—J F S]

89 In *idiopathic erysipelas* the treatment must be guided according to the degree of the inflammation. General antiphlogistic treatment is rarely necessary in this case, usually the application of leeches and of cold water or lead wash are sufficient for resolution.

[Leeches should never, under any circumstances, be applied locally, as the irritation resulting from their use itself frequently excites erysipelas or rather erythema. If absolutely requisite, puncture with the lancet is to be employed.—J F S]

90 In *erythema consensual* the treatment varies according to its original cause. If it depend on the tension of aponeurotic expansions, incisions, warm bathing, friction with mercurial ointment, warm fomentations and poultices must be applied. If the erysipelas appears only as a reflection of deeper disease of the periosteum, of the tendons, or of cellular tissue, so long as the disease continues purely inflammatory, abstraction of blood, leeching, applications of cold lead wash and free mercurial friction, and, in metastasis especially, mercurial laxatives and warm aromatic fomentations, must be used, in gastric symptoms, with

loaded tongue, heartburn and the like, a vomit should be first given, by which principally the course of the disease is rendered less severe But, if gangrene or ulceration have occurred in the deeper parts, and there appear a spot particularly discoloured or fluctuating, it must be opened and the wound dilated with the blunt-ended bistoury upon the finger in every direction where the destruction of the cellular tissue has occurred, in order to discharge the pent-up ichor and the often large pieces of completely dead cellular tissue The further treatment consists in supporting nature to throw off the destroyed parts, to sustain the sinking powers, and to produce good suppuration According to Rust, there may be applied locally bark, camphor, myrrh, charcoal, camomile flowers, turpentine oil, camphorated spirit, pyroligneous acid, spirituous aromatic fomentations, and so on, internally, powerful tonic remedies are to be used in connexion with mineral acids, and, if thereby a good suppuration is produced, the healing may be aided by the application of a moderately compressing bandage I have, however, noticed, that under this stimulating local treatment, the destruction and unhealthy suppuration as well as the general irritation have increased, and that by the use of warm fomentations and a suitable general treatment improvement has been much more quickly produced, I, therefore, only use warm applications locally In great hardening of the skin and of the underlying cellular tissue, I have always effected a perfect resolution by mercurial infliction and malt baths

[Neither leeches, cold washes, nor mercurial friction are, according to my experience, of any material advantage, and therefore hurtful, as causing waste of time The best local treatment, and which I almost invariably adopt, is, when the skin is tense, shining, and deep red, to make several incisions, according to the extent of the disease, from an inch and a half to three inches in length, which I think preferable to very long cuts, just through the skin into the cellular tissue, which should be so disposed that every four should have interposed between them a sort of diamond-like space, and thus, when several cuts are made, the skin has a net-like appearance, and yields in every possible direction The object is not to obtain blood, which, indeed, I generally endeavour to avoid by bathing for a few minutes with cold water, if there be any disposition to bleeding, but to allow the cells of the cellular tissue to empty themselves of the fluid with which they are loaded, the effect of which is, that the skin, being farther relieved of tension, is less likely to slough, and the tissue itself being no longer squeezed by the effused serum, the blood passes freely through its capillary vessels, and its life is preserved, instead of it becoming strangulated If the tension be not sufficiently relieved, or if the disease be continued up the limb, it will be necessary to make additional cuts from day to day, which is the only chance we have, that I am aware of, to prevent the death of the cellular tissue, and it each time relieves the patient's sufferings most remarkably In one instance of a man who had inflammation of the cellular tissue of the back of the hand, resulting from a strain, and which travelled up to the chest, I made about thirty cuts, mostly three inches in length each during the course of the week, nearly the whole cellular tissue of the arm sloughed, but he completely recovered, his arm, however, closely resembling a piece of scored pork]

In these cases brandy, wine, porter, general good feeding, and humouring the appetite, are absolutely necessary, and infinitely preferable to medicine, which should be restricted to an opiate, or an occasional dose of castor oil, as needed —J F S]

91 In the treatment of the various kinds of erysipelas, we have given the treatment proper for each, and which has been proved by experience The opinions, however, of the most distinguished physicians differ from each other in many important points on this subject Thus the incisions should only be made in pseudo-erysipelas, and of the su-

table length and depth, according to RUST, DUPUYTREN and LAWRENCE while, according to HUTCHISON (*a*), they should be made early and in considerable numbers, but DOBSON (*b*) employs numerous punctures with a lancet in all kinds of erysipelas and on all parts of the body. In pseudo-erysipelas DUPUYTREN (*c*) professes, in some cases, to have effected a satisfactory resolution by blistering the diseased part he, however, considers this remedy as doubtful, as in other cases he noticed deterioration and sloughs occurring after its use. But, in all cases of common erysipelas, if the tongue be moist and little red, the skin moderately hot, and slight general reaction connected with the local inflammation, he considers the suppuration produced by one or more blisters upon the inflamed part as the best mode of effecting resolution. Some (*d*) would arrest the extension by the application of a blister at the margin of the erysipelas, but others (*e*) entirely reject their use. BRETONNEAU (*f*) and VELPEAU (*g*) have had the happiest results from moderate compression of a limb attacked with inflammation, even when the transition to suppuration seemed unavoidable and all other remedies had failed. LAWRENCE and DUNCAN have, on the contrary, observed bad effects resulting from this practice (*h*).

[Another mode of attempting to check the spread of erysipelas, is that of enclosing it, if small, within a space bounded by a belt, a quarter or half an inch wide, made on the skin with nitrate of silver, or, if a limb be affected, by gartering it in the same way with the nitrate of silver some inches above. I have sometimes seen the erysipelas extend up to the belt and there stop, at other times I have observed it move on without having met with any check. I am therefore doubtful of the efficiency of the nitrate of silver, but, if used, it should be carefully applied, even to blistering the skin, otherwise it is certainly useless.—J. F. S.]

92 As various also are the opinions as to erysipelas consequent on wounds, (*Erysipelas traumaticum*), in which the most opposite fomentations, blisters, incisions and scarifications, cauterization with the red-hot iron, (LARREY,) antiphlogistic treatment, emetics, and so on, have been recommended. If the above-described different kinds of erysipelas and pseudo-erysipelas be borne in mind, and, if it be remembered that the traumatic erysipelas, which in four or five days accompanies wounds, is produced by different causes, as too great irritation of the wound by improper bandaging, foreign bodies, the application of greasy, too stimulating or too hot softening remedies, cold moist air, a bruised and torn condition of the wounded part, wounds of fibrous structures, gastro-biliary affections, mental excitement, improper food, and the like, it may be easily perceived, how a proper observation of the various causes can alone prevent a merely routine treatment of so important a disease (*i*).

(*a*) Case of Erysipelas, with Remarks, in Med Chir Trans, vol xiv p 213.

(*b*) On Treatment of Erysipelas by Punctures, in Med Chir Trans, vol xiv p 206.

(*c*) DUPUYTREN, as above, p 322. OLIVET, Thèse, de l'Erysipèle Phlegmoneux, p 30.

(*d*) ROCHER et SAVON, Nouveaux Éléments de Pathologie Medico Chirurgicale, vol 1 p 352. LAWRENCE, as above, p 63.

(*e*) RAYER, Traité des Maladies de la Peau, p 125.

(*f*) Sur l'Utilité de la Compression dans les Inflammations Idiopathiques de la Peau Par, 1815

(*g*) Mémoire sur l'emploi du bandage Compressif dans le Traitement de l'Erysipèle Phlegmoneux, de la Brûlure et des plusieurs autres inflammations aigues des membres, in Archives Générales de Médecine, Juin, 1826, p 192.

(*h*) LAWRENCE, as above.

(*i*) Compare LARREY, Clinique Chirurgicale, vol 1 p 21, BALLING as above.

II —OF BURNS

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93 Burns (*Combustiones, Ambustiones, Lat , Verbrunnungen, Germ , Brûlures, Fr*) are produced by fire or heated substances touching our bodies The action of caustic substances, especially of the concentrated mineral acids, corresponds precisely with that of fire According to the degree of heat, in fluids therefore according to their consistence and capacity for heat, according to the duration of the contact and the delicacy of the part touched, different degrees of burns are produced, which may be thus distinguished 1 as *superficial inflammation* (*Erythema*,) 2 as *more severe inflammation with rising of the cuticle into blisters* (*Vescication*,) 3 *more deeply penetrating, higher inflammation, with the destruction of the cuticle and of the mucous net* , 4 *gangrenous destruction at different parts and to various depths*

Degrees of burns are variously distinguished, as they are considered not merely as to their intensity, but also with reference to their spreading into deeper parts Many point out but three degrees DUPUYTREN has described six , of which the latter, how ever, only differ in proportion as the gangrenous destruction is more or less deep, or involves the whole bulk of the limb The four above-mentioned degrees are based on the corresponding steps of inflammation, viz , the erythematous, exudative-inflammatory-vesicular, the phlegmono-suppurative and gangreno-sphacelous According to the variety of causes producing burns are these degrees of burning frequently blended with each other, for instance, in burns with hot fluids

94 The *first degree* of burn, arising from hot vapour, from the momentary or lengthened touch of a more or less hot body, produces a bright uncircumscribed redness of the skin, as in erysipelas, which for the moment disappears on pressure of the finger, without swelling, and is accompanied only with increased turgescences of the skin and a little pain Febrile action only sets in if this degree of burn be much spread and in sensitive persons The redness of the skin either disappears after some hours or days, when the cuticle scales off

95 In the *second degree*, which is most commonly produced by hot fluids, the cuticle rises either at once or gradually into larger or smaller blisters, filled with clear or yellowish fluid, the redness and swelling of

the skin is more distinct, the pain severe, burning, and, according to the degree of these appearances and the extent of the burn, do febrile symptoms set in. These blisters either shrivel together and dry, the fluid being absorbed and the skin thrown off, or, if they burst and are opened the fluid is discharged, the blister falls together, dries, and after some days either a new cuticle is produced or the exposed part suppurates. The healing leaves no scar.

96 The *third degree* of burn is usually produced by the flame of fire or by the lengthened touch of hot bodies, especially of hot fluids, and is characterized by gray, yellowish, or brown spots, which are thin and soft, insensible to light pressure, but are painful if the pressure be increased, at the same time generally appear blisters full of brownish or bloody fluid, the surrounding parts are very red and much swollen. The general reaction corresponds to the degree of the inflammation. After six or eight days, and frequently later, the remains of the destroyed cuticle and mucous net are thrown off, and the cure is effected by granulations and the formation of a white glossy scar.

97 In the *fourth degree* of burn the destruction penetrates either through the entire thickness of the skin and cellular tissue, or deeper into and through the muscles to the bone, or the whole part is destroyed and charred. This degree is produced by long contact with fire, red hot or molten metals, boiling fluids. The sloughs differ in thickness, are completely insensible, soft, gray, or yellow if produced by hot fluids, brown or black, dry, hard, and sounding when struck, if caused by fire or dry hot bodies. In the immediate neighbourhood of these sloughs the skin is drawn into radiating folds, the surrounding parts are extremely red and swollen, very painful, and frequently beset with blisters. The slough is thrown off by the suppuration which takes place around it, and a more or less deep suppurating space is produced, which commonly has a much larger extent than the slough, because in consequence of the severe inflammation its immediate belt is destroyed by gangrene. The granulations most usually are developed very quickly and luxuriantly, the edges quickly draw together, and shapeless, hard, contracted, tough scars are produced, whereby the direction and motion of the part is often changed and impeded, and the latter even perfectly destroyed. After the throwing off of a part which has been entirely charred, a more or less uneven stump is produced.

98 More or less severe symptoms ensue according to the different degree and extent of the burn, according to the importance of the burnt part, and the constitution of the patient, and not merely does the degree, but also the extent of the burn, determine its danger. In the first two degrees the inflammation is easily resolved, and only if it affects a large extent of the body, and still more in the higher degrees, does febrile reaction set in, when, on account of the disturbed functions of the skin and the changed relations between the external and internal skin, the mucous membrane of the intestines is quickly affected, and uneasiness, loss of sleep, red dry tongue, nausea, vomiting, high nervous excitement, delirium, and the like come on. From the severity of the pain cramps and convulsions occur, especially in sensitive persons. In extensive burns death may ensue rather suddenly from the greatness of the pain,

from the quick stopping of the functions of the skin, from the excessive flow of blood to the internal parts where on dissection either no internal derangement is seen, or where a gorging of the brain and mucous membranes with blood and even effusion into their cavities is observed, or from the severity of the fever, especially if accompanied with inflammation of internal parts, of the stomach, intestines, brain, more rarely of the lungs and of the pericardium, or from the very copious and continued suppuration, by which the powers are exhausted. The production of unsightly hard scars, or the growing together of neighbouring parts, may cause disturbance or complete stoppage of their functions.

[Burns, from whatever cause, are generally more dangerous than scalds, as they are rarely unattended with destruction of the skin and subjacent parts, whilst, on the contrary, scalds more usually produce only vesication. If, however, a person be completely immersed in boiling water, even for two or three minutes, of which I once saw a frightful instance, of a dyer who fell into his copper, he will be destroyed in ten or fifteen minutes. But I have several times, on the contrary, seen persons, whose entire surface has been charred by fire, live for many hours. This remarkable difference may, perhaps, be accounted for by presuming that the hot water, passing through the mouth and nostrils into the pharynx, causes speedy effusion into the loose cellular tissue connecting the skin with the laryngeal cartilages, and so, by narrowing and closing up the aperture of the windpipe, producing suffocation.

Both burns and scalds, however, are dangerous, more in reference to the part which they attack, than the extent of surface they injure, thus, scalds or burns on the chest and belly especially are far more dangerous than on the limbs, although the injured part be twice or thrice as extensive, and children who are burnt or scalded on the chest most commonly die in two or three days after the accident, in a few instances they may live a week, but they rarely ever recover. I recollect only a single instance of recovery, after severe burn on the trunk, in a child about six years old, in whom the whole front of the belly and flanks were burnt and a considerable part of the skin destroyed. I do not recollect to have observed convulsions in these severe cases, as mentioned by our author and other writers, but, if they be fatal in a few hours, the patient generally almost at once, drops into a state of stupor from which he never awakes, and examination after death shows the brain loaded with blood, or, if life be prolonged, effusion of serum is observed on the membranes, and in the cavities of the brain, and, less commonly, also in the serous bags of the chest.—J F S.]

99 The slighter degrees of burn require merely the application of cold water, or the dipping the part in cold water, all other of the prescribed remedies, lead wash and so on, act only by their coldness. If fever be present the internal use of antiphlogistic remedies and a suitable diet must be combined with the local treatment. If the cuticle have been raised into blisters, they should be opened with a fine lancet, without removing the skin, so that the contained fluid may escape. If they be small, they often, under the use of cold, fall together and dry. If the part be deprived of its cuticle, generally it will not bear the cold application, which irritates, and increases the pain, but simple, mild, soothing remedies, mucilaginous, mild poultices or fomentations, a liniment of pure oil and yolk of egg, fresh butter, and other mild salves may be spread on pieces of soft linen, which should be applied over the burnt part, and often changed, or they should be frequently sprinkled with the remedies, to prevent their drying and sticking, so as to soften and cool by their frequent renewal. Cold is always to be applied to the neighbourhood of the parts deprived of their cuticle. When suppuration is established, and the extreme sensibility of the affected part reduced by the use of mild remedies,

astringent and drying applications are to be gradually had recourse to. Linseed oil, with lime water, zinc ointment, and so on. Lead ointment is said to produce ugly ill-shapen scars, which, however, I have not observed. If much proud flesh occur, it must be kept down with nitrate of silver. If mortification be produced at the instant of the burning, cold application, or, if the parts are very sensitive on account of the destruction of the cuticle, merely softening and soothing applications must be used till the slough is thrown off by the suppuration, when the remedies aforesaid must be employed. Sloughing rarely extends in this case, if not accompanied by deterioration of the juices. In other respects its treatment, even when resulting from the inflammation depending on the burn, is to be after the same general rules laid down for gangrene.

The remedies especially recommended for burns are very various, and in part completely contrary to each other in their operation. 1. Popular remedies, such as poultices of scraped potato, apples, moist earth, and so on, which are cooling by their proper removal. 2. Applications of spirituous fluids, ether, alcohol, brandy and so on, if used cold, act also coolingly by quick evaporation, if warm, they can only act as counter irritants but all burns in which the *rete cutaneum* is exposed must be protected from irritation. 3. The burnt part is brought near to the fire immediately after the burning. 4. Wraps, by which the burnt parts are kept perfectly closed against external influences. The overlaying of fine cotton or wadding, to be kept moderately tight with bandages till it falls off. If blisters are present, they must be first punctured. The strewing with flour and bandaging with dry linen. If pain recur, the linen should be removed and the flouring repeated again and again till it is a quarter or half an inch thick. In very severe burns, after a fortnight, a fourth of calamine powder is added to the flour and applied moist. Covering with chalk, smearing with amber-varnish or tragacanth mucilage spread on blotting paper or fine linen. The watery solution of lunar caustic, recommended by FRICKE, operates in a similar way, by defending the sensitive surface and furnishing it with a covering beneath which speedy healing takes place. In like manner is the operation of creosote to be explained, from which, when diluted with water, or mixed with grease as a salve, I have frequently observed the best consequences. 5. Various ointments for burns, consisting of fat, butter, wax, cream and the like. LARREY forbids all cold and cooling remedies, and uses saffron ointment and ointment of styrax. 6. Solution of chlorate of lime, wherewith the bandage is to be frequently moistened during the day, causes a slight itching for about ten minutes, and is, according to LISFRANC, useful in slight degrees of burn, producing new skin in twenty-four hours, in higher degrees the suppuration is diminished and improved.

Much difference of opinion has existed and still exists among English surgeons, as to the choice of remedies for burns and scalds. Whilst some prefer moist applications, cold or warm, either as washes or liniments and ointments, others advocate the use of dry substances, as cotton or flour and the like. I shall first mention some of the more prevalent plans of treatment, and afterwards describe my own ordinary practice, without, however, claiming for it any great degree of originality.

JAMES EARLE was the principal supporter of cold moist applications in form of very cold water or even ice, pounded and applied on clothes or in a bladder. HUNTER observes — “Cold lessens all inflammations, and is a very good application where it can be applied, but it cannot be applied so universally as others. However, cold has this disadvantage, that the pain, although removed while under the application, occurs with double force when it is removed, much more than from any of the applications, and the reason is evident, for, as the warmth returns, the pain is increased by the warmth, even in sound parts” (p 218). HENRY EARLE (a), also, although he advocates both cold and warm applications on certain conditions, notices the objections which exist in reference to the use of cold, at the same time that he mentions its advantages. He says — “The advantages of the plan (the application of cold) are, that it may generally be resorted to without delay, and that it has the effect of affording immediate relief. The disadvantages attending it are, it is necessary to continue or renew the application of cold for a considerable time, as the heat and

(a) Clinical Lecture on Burns, in Medical Gazette, vol v 1830

pain will return, unless the diminished temperature be steadily maintained. On this account it is that, in certain delicate constitutions, and especially when the injury extends to the chest or trunk, this cooling plan of treatment cannot be employed without risk (p 301)

The treatment recommended by KENTISH (*a*), and consisting of the primary application of warm and stimulating remedies, is generally practised in the coal districts of the North of England, and therefore, if for no other reason than that it has been there found successful, is well entitled to notice. I have had a little experience of its effects, and do not think it less advantageous than most other plans of incipient treatment, which is the principal point of difference in the practice. KENTISH's theory of the treatment of burns and scalds is founded on the mode of treating frost-bite, the very reverse of which he considers, with a fair show of reason, is here indicated. Nor are his views to be set down as "visionary, as amusing the fancy, but never capable of improving the judgment," nor are they "nearly unintelligible, nor unsupported by any sort of rational evidence," as they have been asserted to be by SAMUEL COOPER. The question "the effects of heat above the freezing point, carried to the extent of what is termed burning," being the converse of its effects "below the freezing point, commonly called the effects of cold," it will be, on the whole, more convenient to leave the discussion of till we treat of frost-bite.

KENTISH's object consists in "restoring the unity of action," as he calls it, in these "local injuries from increased action," * * * first, by gradually diminishing the excitement or action of the part, and, secondly, by increasing the action of the system to meet the increased action of the part, holding this law of the system in view, *that any part of the system having its action increased to a very high degree, must continue to be excited, though in a less degree, either by the stimulus which caused the increased action, or some other having the nearest similarity to it, until, by degrees, the extraordinary action subsides into the healthy action of the part*" With this view, holding the part to the fire seems the best mode of relief, but, as parts of the body are injured where this cannot be done, the most stimulating applications must be had recourse to, for, in this class there is little fear of any of them being greater than that which originally caused the accident, the strongest rectified spirits made still stronger by essential oils, add to which they may be heated as much as can be suffered on the sound parts, these, and many more applications of the same class will give the speediest and most effectual relief. These are only to be continued for a certain time, otherwise they may afterwards cause the very ill they were given to cure, and should be succeeded by less stimulant applications, until the parts act by the common natural stimuli. The internal mode of relief will be to give those substances which soonest excite the system to great action, such as æther, ardent spirits, opium, wine, &c, by which means the solution of continuity of action is allowed to continue the shortest time possible, and the unity of action restored, which constitutes the cure" (pp 112-14)

The mode in which KENTISH sets about the primary dressing of burns is as follows —

"Take a teacup and put some of the best rectified spirit of wine, or spirit of wine with camphor, or spirit of turpentine, into it, then place it in a basin of hot water, so as to heat it to what you can bear with your finger, then, by means of a rag dipped in this, or a probe armed with a good deal of lint, wash and bathe the whole of the injured surface, which when done two or three times over, apply plasters to the whole, formed in the following manner — Take of the common yellow basilicon, *ung. resinæ flavæ*, according to the occasion, let it be mixed up with as much spirit of turpentine as it will take to make it of the consistence of a liniment, which, when spread upon thin oiled cloth, is to be applied to the part the wax and oil of the basilicon will fill up the pores of the cloth so as to prevent evaporation, by which means the strong stimulant powers of the turpentine, or alcohol, or camphor, or all together, are so confined upon the surface as to excite the absorbents to the very increased action we wish, and, when this has taken place, the small quantity of oil is sufficient to preserve the cuticle in a pleasant state," (p 132)

KENTISH disapproves of frequent dressings, "for the very quick evaporation that takes place on exposing or uncovering the surface any time during the first four-and-twenty hours is pernicious, I therefore only dress the patient once a day even at first, unless in some instances * * * But it will be better to allow him to remain

for the first twenty-four hours without being disturbed, if the plasters are spread tolerably thick with the ointment, there will be no need of using any farther means till the next dressing." The parts are to be exposed to the air as little as possible, and therefore the plasters are to be prepared before the dressing is commenced. The heated pure spirit is generally not again required, therefore, at the second dressing, the redness or seeming inflammation appearing less vivid, "proof spirit or laudanum with the coldness taken off, will be sufficient for this dressing, and the plasters immediately applied." Within the next twenty-four hours, "generally the appearance of inflammation has disappeared, and where there had been any small vesication in the first instance, there will be seen such a secretion of pus as may be noticed the second day after the application of a blister, the stimulants will now have performed their office, and, if continued on, they will produce unpleasant effects themselves, somewhat resembling the complaint they were meant to cure * * * For which reason, as the equilibrium of action will appear nearly to be restored, it will now be necessary to apply less irritating substances, therefore, instead of basilicon made into a liniment with spirit of turpentine, it may be rendered into a proper consistence with camphorated oil, should even this be too strong and any appearance of irritation take place, the cerate with *lapis calaminaris* or GOURLARD's cerate, will answer every purpose, and abate any irritation that may have arisen from the former applications. What I have found very effectual in such cases, is an ointment made with the addition of a scruple of flowers (ovid) of zinc to an ounce of the white ointment, *ung ceræ*, this, continued until the part heals, is in general sufficient, but, if the skin should, after healing, remain very tender and likely to crack, a liniment formed of lime water and linseed oil would be useful. I have frequently found much advantage from camphorated oil in this stage. These means properly attended to, and keeping the tender skin covered from the too great action of the external air, I have found effectual in curing, and quickly restoring the cuticle to a healthy state, after most severe eases" (pp 133-36)

[Dr Gross has recommended for the treatment of burns and scalds the carbonate of lead well mixed with linseed oil in the form of thin white paint

The best mode of applying it is to smear the affected surface with a layer, sufficiently thick to conceal it from view, by means of a large camel's hair pencil. If vesicles exist their contents must be evacuated with a fine needle, and the part carefully dried, otherwise the lead will not adhere. The dress is completed by covering the surface with old linen and confining it with a moderately tight roller. In superficial burns one application is often sufficient if the lesion is deep however, it should be renewed at least once in the twenty-four hours. In mild cases, the paint and epidermis form a dry incrustation, which usually drops off in three or four days, leaving the surface beneath entirely well or of a slightly excoriated appearance — Bulletin of Medical Science, July, 1845 — G W N.]

Raw cotton has of late years been used in America. GIBSON (*a*) says — "The best application I have ever tried is raw cotton, thinly spread out or carded, and laid directly over the burn. The value of this remedy was ascertained accidentally, a few years ago, (previous to 1824,) by a lady living in Hartford County, Maryland, whose child was scalded by boiling water, nearly over its whole body. The mother was carding cotton, in an adjoining room, at the time of the accident, and, having no medical assistance within reach, undressed the child as quickly as possible, and covered the whole burned surface with masses of the cotton. The effect was wonderful, for the child soon became perfectly quiet, fell asleep, and, upon removing the cotton, a few hours afterwards, no inflammation whatever could be perceived. DR DALLAM (*b*), to whom we are indebted for an account of this case, has furnished others of a similar character, in which the cotton proved equally efficacious, and my

(*a*) The Institutes and Practice of Surgery, being an Outline of a Course of Lectures Philadelphia, 1838 5th Edition

(*b*) On the Use of Cotton in Burns, in PORTER'S Medical Lyceum, p 22

own experience enables me to confirm his statement of its usefulness. It is only, however, in the superficial burn that this remedy can be relied on (p 51.)

Dr ANDERSON (*a*) is a strong supporter of the use of cotton in burns, he says — “The utility of cotton is most conspicuous in simply vesicated burns, where one or at most two renewals of it are sufficient, and it is to these easies that I believe its application has generally been restricted. But I have used it in a great variety of cases, recent and old, vesicated and sphæcelated. From the state of the parts after a deep burn, the cotton generally requires renewal about every six or eight days, until the sloughs have long separated and the discharge has been diminished. The comfort enjoyed during such intervals should go far to recommend this practice, even if, in other respects, it had no advantage over that by a daily renewal of the dressings. But I am now quite satisfied that a persevering use of this remedy, even in the chronic state of burns, and in many other ulcerations, is in every respect preferable to the practice usually adopted (p 211.) Some care is necessary, both in preparing and in applying the cotton. For this purpose it should be finely carded, and disposed in narrow fleeces, so thin as to be translucent, by which means it can be closely applied in successive layers, and is thus made to fill up and protect the most irregular surfaces. The burnt parts, if vesicated, are to be washed with tepid water, and the fluid evacuated by small punctures, or, if more deeply scorched, they may be bathed with a spirituous or turpentine lotion. The cotton is then applied, layer after layer, until the whole surface is not only covered, but protected at every point, so that pressure and motion may give no uneasiness. On some parts it will adhere without a bandage, especially when there is much discharge, but, in general, a support of this kind is useful. Where the vesications have been broken, and the skin is abraded, or where there is sphæcelus, more or less suppuration always ensues, and in such cases the discharge may be so great as to soak through the cotton and become offensive, particularly in summer, so that it may be necessary to remove the soiled portions. This, however, should be done as sparingly as possible, taking care to avoid uncovering or disturbing the tender surface (pp 213, 214.)

“There appears,” ANDERSON farther observes, “to be a twofold effect from this kind of treatment. The primary effect arises from the exclusion of the air and the slow conducting power of cotton, by which the heat of the part is retained, whilst a soft and uniformly elastic protection from pressure is afforded. The secondary effect depends entirely on the sheath or case formed by the cotton absorbing the effused serum or pus, and giving the best possible substitute for the lost cuticle. But, in order that the full benefit may be derived from this substitute, and to ensure an equable and continued support to the tender parts until the new skin is formed, it is absolutely necessary that this new or *cotton cuticle*, as it may be called, should not be removed except under particular circumstances, until the real cuticle is sufficiently formed to bear exposure (pp 217, 218.)

The use of flour as an application for burns was, I believe, first recommended by Dr WARD (*b*), formerly one of the surgeons of the Manchester Infirmary, who appears to have employed it accidentally at first, for, finding a young woman who had been sealed from the elbow to the fingers’ ends, screaming with pain and shivering as if in the cold stage of an intermittent whilst her mistress was rubbing in goose grease, preparatory to the application of scraped potato, he absorbed the grease with soft linen, and then with a flour-dredger, which happened to be at hand, sprinkled the sealed parts as completely and expeditiously as he could, which almost immediately and entirely relieved the pain. The same application was used by WARD in several other easies (p 619.) His mode of proceeding he thus describes — “The first object will be, (after having laid the patient upon a bed or sofa,) without a moment’s loss of time, to take off the clothes and apply bread flour, by means of a common kitchen dredger, plentifully, and as expeditiously as possible, to the whole of the burned or sealed surface, and this being properly and sufficiently done, carefully applying clean dry linen cloths immediately over the flour, and such bed-clothes or other coverings as may be required to keep the patient comfortably warm, but not too hot.” He strongly advises “avoiding the application of liquids of whatever kind, including oil, and liniments, ointment, and salves containing oil, all of which

(a) On the Treatment of Burns, in Glasgow Medical Journal, vol 1 1828 8^{vo}

(b) A New Method of Treating Scalds and Burns Two Papers, in Lancet, vol 11 1828

are extremely pernicious." If the pain be removed by this first application, it is advisable that the patient should go to sleep, even though he have no nourishment "If pain return, we must commence by removing the linen coverings or bandages from those parts where the pain is the most considerable, without attempting to remove any of the flour previously applied, except such portions as do not adhere, and then proceed as before to apply flour equally and copiously to the painful parts, by means of the dredge, which is the easiest and best method of effecting it" * * * It would also be a good general rule, particularly at the first and several of the succeeding dredgings or sprinklings, to continue the process for a certain time (longer or shorter, according to the extent of the violence, and the degree of pain complained of) after the parts become easy, (with a view to keep them in that state as long as possible,) and steadily to persevere in it either until the last-mentioned object be attained, or the parts affected shall have received a coating or covering of this invaluable article of from a quarter to nearly half an inch in thickness, and then apply the bandages, as before and, secondly, not to disturb those places which still continue easy in consequence of having undergone one or more sprinklings or dustings, until the return of pain or uneasiness shall indicate the necessity of repeating it "And, in this manner we must proceed the first two or three weeks, or until that period shall arrive when it will be necessary to make some addition to the flour" (p 176) This addition consists of one portion of calamine powder to three of flour, gradually increasing the calamine till the proportions are equal, and then by degrees diminishing the flour till the calamine alone is applied, except some calamine ointment with an increased quantity of the earth, spread very thinly on linen, and laid over the powder A moderate diet is allowed, commencing first with milk, puddings, broth, and soup Medicines are to be used sparingly, but, if sleep cannot be obtained, then opiates,—DOVER's powder, perhaps, in preference to laudanum, in proper doses every four or six hours, rather than one large dose, or an opiate friction on any uninjured but sufficiently extensive part to be effectual WARD's explanation of the *modus operandi* of flour is, "that, by its instantaneous operation as an absorbent power, in allaying the irritation, and partly by its coldness diminishing the temperature of the inflamed parts, it immediately arrests the rapid progress of the inflammation, and forms a fit medium or covering to prevent the access of the atmospheric air to a part of the body which is at all times peculiarly susceptible of its action (especially upon a large and extended surface of it) but which is now rendered a thousand times more susceptible than before

MARSHALL (a) makes the following observations on the *modus curandi* of the remedy—"This mild substance," says he, "is doubtless pre-eminent to all others hitherto in use, by imparting immediate ease to the inflamed and irritable surface, it rapidly heals by the scabbing process, in uniting with the discharge from the abraded cutis, and almost instantaneously forms a temporary semi-transparent covering, thereby assisting the natural functions in restoring the epidermis The advantage becomes evident by stopping a profuse discharge, and the tedious progress of ulceration That remarkable substance the animal (vegetable?) gluten, peculiarly contained in wheat, seems, in this instance, to assist the rapid regeneration of the scarf-skin, and thus protects the *cutis* and *rete mucosum* The surface of the body being wonderfully supplied by the extension of the cutaneous nerves, in the form of a soft pulpy membrane, somewhat resembling the expansion of the optic nerve on the retina, readily affords, it is presumed, an explanation of the great violence offered to the system in all cases of extensive burn or scald The topical remedy is equally suitable to either of these accidents, and perhaps, eventually, will be found useful in many other cutaneous affections * * * When the flour has formed the artificial covering, the farther application becomes comparatively superfluous, which is perceived by its rolling off" (p 298) Beyond a single slight ease, which did very well, I have no personal knowledge of the effects of flour, but I know some of my friends think it a good application —J. F S

On the primary treatment of these accidents HUNTER says—"Whatever will abate inflammation arising from accident, will have the same effect upon a scald or burn, and, from the diversities of applications, we have opportunities of knowing the best Oil was long an application, but which has no virtue, spirits have also

(a) On the Treatment of Burns, in London Medical and Physical Journal New Series, vol iv 1829

been long applied, and with very good effect. The common application, which is a soap made with lime water and oil, seemed to answer better, and now vinegar (*a*) is strongly recommended, and I think with justice as far as I have seen" (p 218) The best secondary treatment HUNTER considers to be that by scabbing, of which he says, "the mode of assisting the cure of wounds by permitting a scab to form, is likewise applicable, in some cases, to that species of accident where the parts have not only been lacerated, but deprived of life" And then observes—"This practice is the very best for burns or scalds, after the inflammation has either been considerably prevented, or subdued, by proper applications or by time, for which there probably are more remedies than for an inflammation arising from any other cause, as if there was something specific in such causes" (p 217)

The two French surgeons, BRETONNEAU of Tours and VELPEAU, who have been already cursorily noticed as employing pressure in pseudo-erysipelas, have also recommended it in the treatment of burns. BRETONNEAU (*b*) advises the application of circular bandages, either dry or moistened with a discutient or narcotic wash, the vesicles, if any, having been emptied by one or more punctures. He considers that the pressure, besides preventing evaporation of the serosity, keeps the cuticle on the *rete mucosum*, and thus protects it from the air and external agents. But, if the burnt part be stripped of its skin, oiled silk carefully fitted is to be first applied. VELPEAU (*c*) recommends strongly the employment of compression in burns, by the application of diachylon plaster spread on strips of cloth, although he very candidly admits that farther experience is yet requisite to perfect this mode of cure. He lays great stress on the composition of the plaster, that it should contain neither too large a proportion of grease nor of diachylon, but that there should be a pretty large quantity of litharge, and that it should be of a softish consistence, as the effect is produced not merely by the compression, but varies according to the composition of the plaster" (p 187) Adopting the four degrees of burns mentioned by our author, VELPEAU says that—

"1 In those of the first degree characterized, by erythema or even tumefaction, with itching or slight pain, all modes of treatment succeed, and that it is not therefore, in this case lie hopes particularly to recommend his own 2 That, in those of the second degree, characterized by the coming off of the epidermis or phlyctænæ, without alteration of the mucous body, the effect of the straps shows better 3 That, in those of the third degree, that is to say, those where the mucous net-work has been partially destroyed, and in those of the fourth degree, where the skin is completely converted into eschar, his mode of treatment is almost indispensable" And he then proceeds—"In burns of the first degree very good results are obtained from cold water, camphorated brandy, solutions of chlorures, and compression especially, but that the efficacy of the latter varies according to its application. Thus, I am persuaded that the straps are preferable to simple compression, because their employment is easier, because they do not fall off, and may remain a much longer time, than in those of the second degree, cold water, refrigerants, chlorurated solutions, especially, may cure, the phlyctænæ being first removed, for I hold much with this little operation, without which I never employ any application" (p 186)

His mode of proceeding is thus described—"1 Strips of cloth spread with diachylon are to be applied upon the injured surface 2 Indispensable that they should be applied very equally on every part of the wound to prevent strangulation 3 They must be so applied as not to loosen, and it is therefore necessary they should make at least one turn and a half round the leg 4 When the regions upon which they are applied are irregular, the hollows must be filled with echarpie or cotton, thus, for instance, if there be a wound on the foot, the sole is to be thus padded, so as to form a rouleau 5 The strips require different directions according to the form of the limb on which they are applied, thus, on the leg, which forms a concave, they must be placed spirally, commencing from below upwards 6 Each strap should cover two-thirds of the width of that below it, to render the compression

(*a*) This was CLEGHORN, the Edinburgh Brewer's Treatment, for which see his Account of a Method of Curing Burns and Scalds, in three Letters to JOHN HUNTER, in Medical Tracts and Observations, vol ii London, 1792

(*b*) Already quoted, *par* 91, p 124

(*c*) His Clinique—Brûlures, Traitement par les Bandelettes de Diachylon, in L'Academie Francaise, vol iv 1835

uniform" (p 187) The advantages derived from this plan of treatment are, according to VELPEAU's views, the following —

" 1 In burns of the first and second degree, the application is followed by a more prompt cure, i.e., it is completed after one or two applications at most, or in a day or two 2 That in those of the third degree three or four applications are needed, which require eight days at most, whilst other modes require fifteen days or a month 3 That the cure of burns of the fourth degree depend on the depth of the wounds" (p 186)

In now proceeding to give an account of my own mode of treatment, I would premise that HENRY EARLE's observations on the careless mode in which clothing is too commonly removed after burns and scalds, are well worthy attention "It unfortunately happens, too frequently," says he, "under these circumstances, that the first thing done is to remove the stocking, which often brings away with it large portions of the cuticle, leaving the inflamed cutis denuded, for, although in these cases sufficient time may not have elapsed for the occurrence of inflammation and the production of vesications, yet the application of the hot liquid will cause sufficient separation between the dermis and epidermis to cause it to come away on pulling off the stocking If, instead of this forcible removal of the clothes, such limbs were to be immediately immersed in the coldest water, this most serious result would generally be prevented The same clothes which were the medium for retaining the heat may be made the readiest means of abstracting it and of diminishing the inflammation, and, should it become necessary, in consequence of the formation of vesicles, to remove them, they should be cut away with the utmost caution, and the vesicles preserved unbroken, by which the serious consequences which follow the exposure of the highly inflamed cutis, will be prevented" (p 301)

The justness of these observations, as regards not merely the increase of the patient's sufferings, but also to rendering his situation much more dangerous, especially if the vesications be large, must be sufficiently obvious It is, therefore, scarcely necessary to observe that the removal of the clothes should be effected with great carefulness, and EARLE's advice as to thoroughly soaking them in water, either warm or cold, according as the practitioner may prefer applying his remedies in one or other state, is very excellent and highly deserving of being acted on After soaking, it is better to cut the clothes through with scissors, till the whole will drop off or the patient can be lifted out of them, rather than to drag him about as is frequently done for the purpose of saving the clothes at the expense of the patient's skin

My own observation and experience lead me to consider the local treatment of scalds and burns as very simple, the great object in view, if there be vesication, to whatever extent, without death of the skin or subjacent parts, being to defend the exposed highly sensible surface of the true skin from the air, by affording it an artificial sheathing, and thus relieving the irritation of the nervous system If the vesications be unbroken, I think it best to leave them undisturbed, as adhesive matter is speedily effused over the surface of the true skin, directly after the effusion of serum has ceased, an observation which may be daily made in watching the progress of an artificial blister After a time, about forty-eight hours, the serum within the vesication becomes irritant, and this circumstance is indicated by the margin of the uninjured skin bounding it presenting a red line The skin must then be punctured in several parts, varying according to the size of the blister, and near its base, so that the serum may escape, which it generally does slowly, the serum now holding in solution a large quantity of albumen, and not unfrequently seeming as it were contained in large cells, resembling those containing the vitreous humour of the eye, although much larger If when the patient be first seen the blisters are found already burst, the cuticle should not, on any account, be removed, for, wherever it covers it forms too good a sheathing to be taken away In either of these cases I generally first apply linen soaked in warm lime water and linseed oil, keeping it continually wetted with a sponge, without removal for forty-eight hours, after which, suppuration having by that time usually commenced on those parts of the wound which require it for their cure, I have the lime water and oiled cloths gently removed, and all the injured parts, whether to little or great extent, enveloped in bread and milk poultices, which are renewed twice or thrice a day, according to the discharge This application is very bland, a delicate film from the coagulable part of the milk, and the mucilaginous portion of the bread soon covers the exposed tender surface,

or keeps the remaining cuticle supple and moist, thereby rendering the patient extremely comfortable, at the same time, also, that he is kept very clear, and free from offensive smell, which are points of extreme importance in the treatment of scalds and burns, as regards both the health and comfort of the patient I rarely find it necessary to employ any other treatment, for, if the accident be not extensive, in a few days it heals, and, if it be more spread, though the time of cure is necessarily longer, yet the same result ensues Sometimes, however, more to relieve the patient from the strict rest which the poultice requires than for any other cause, after five or six days, the poultice is left off, and zinc ointment spread on lint or soft linen is applied

If the true skin, or together with it more or less of the subjacent parts be destroyed, I still consider a poultice the best, most cleanly, and most comfortable application, made either simply of bread and milk, or bread and linseed meal, which are to be continued till all sloughs have separated and granulations have been fully produced After which wax and oil, or zinc ointment, or calamine ointment, spread on lint, may be gently bound on with a roller

If the granulating surface be very extensive, it is generally long in cicatrizing, the granulations become pale and flaccid, or even disappear, and the pus thins and becomes limpid on the slightest disturbance of the digestive organs, thus putting a temporary stop to the cure, but, the irritation removed, things revert to their former channel, and healing is resumed These alternations occur frequently in the course of a long cure, and must always be carefully watched and tended, as often the suspension of suppuration for a few hours causes determination to other parts, as the brain, lungs, and mucous membrane of the bowels, and the patient is cut off at the very time when there is every reason for his recovery

From the observation I have made of the various modes of treating scalds and burns, it appears to me that it is matter of little consequence what the primary application is, provided it be warm or capable of preserving the warmth of the part Cold washes I do not approve of, especially if the injured surface be large, as then a considerable portion of the body or limbs is suddenly cooled, and very frequently severe shivering is excited which adds much to the patient's discomfort, or if, as is often the case, the patient be already shivering, that condition is increased by the application of cold

If stimulants be at first applied according to KENTISH's plan, or, if cold washes be used immediately after the accident, the important point is to determine how long they shall be continued This, in reference to stimulants, has, as already mentioned, been determined by KENTISH, and, with regard to the cold, is generally continued either till suppuration or sloughing is decidedly set up, and then, as the case may be, simple dressings, either with ointments, or absorbing powders, or poulticing, are resorted to But I think my plan of poulticing throughout is preferable

With regard to the vesications in burns and scalds, unless they be very extensive and attended with destruction of the underlying parts, it will have been observed from what I have already stated that I do not consider them of very material consequence if properly attended to But many persons think it important to prevent them, and endeavour so to do by their treatment, whatever it may be HIGGINBOTHAM (*a*) of Nottingham speaks in favour of using nitrate of silver for this purpose, and says —“I have found that by slightly passing the nitrate of silver once over a burnt surface, the pain is increased for a short time, but then totally subsides, vesication appearing to be prevented, the black cuticle peels off in a few days, leaving the part well” And further —“In cases in which the cuticle has been removed, the nitrate of silver applied on the surface induces an adherent eschar, and prevents the consequent ulceration” (p 149)

The complete charring of the skin of a limb is no proof that the subjacent parts are destroyed or that they will slough and the case terminate, if there be sufficient strength of constitution, by spontaneous amputation The removal of the limb under such circumstances, immediately, is not advisable But if it be fully ascertained that the entire mass has perished, immediate amputation is inadmissible, for the limb is under precisely the same conditions as if under gangrene from any other cause, or gangrenous spontaneously There is always inflammation in the neigh-

(*a*) An Essay on the Use of Nitrate of Silver in the Cure of Inflammation, Wounds and Ulcers London, 1829 8vo 2d Edition

bourhood, either resulting at once from the extended influence of the destructive agent, or very shortly after set up to bring about the separation of the dead from the living part, and if, whilst either of these exist, amputation be performed, there is every probability of a sloughy stump and increase of danger to the patient. It is, therefore, necessary to wait till a line of demarcation between the living and dead parts be formed, simultaneously with which, if the progress of the case be favourable, the inflammation begins to subside, and ceases as suppuration is established, and then is the time to perform amputation if needful. Cases of this kind are not frequent (*a*)

Sometimes it happens that the destruction of skin on a limb has been so great that large wounds remain for weeks or months without any disposition to heal, and with great draught on the patient's powers, from the large suppuration which is kept up. If the use of absorbent powders, as calamine or chalk or the application of nitrate of silver in lotion upon soft rag or lint be insufficient to check the discharge, and to induce the formation of skin, then, if the patient's constitution begin to droop, and not till then, I think, should amputation be performed —J F S]

100 In burns with gunpowder, which, from the black crust covering the part, often seem much more dangerous than they really are, the grains of powder often penetrate the skin, and, if they remain after the cure, grow in and produce a bluish-black discolouration. In parts commonly uncovered, as the face, they must either at first or during the suppuration be removed with a lancet or with a needle, in other respects, the burn is to be treated according to the ordinary rules. If the grains of powder heal in, each must be removed by a little cut.

101 The employment of internal remedies in burns must be guided by the constitution of the patient and by the severity of the symptoms. If the inflammation be high, powerful antiphlogistic remedies must be employed, thereby only can the spread of the inflammation and gangrene be prevented. The great pain and nervous symptoms so commonly accompanying severe burns require at the same time opium both internally and externally in connexion with the ointments mentioned, cherry-laurel water, extract of hyoscyamus. If there be a bad state of the juices, or great weakness, these must be specially attended to in the treatment.

[The internal treatment of scalds and burns is too often overlooked, or little thought of, till it be too late, though it is a very important item in the restorative proceeding. If, soon after the accident, as commonly happens, the patient be attacked with shivering, which is severe in proportion to the extent of the part injured, some stimulant must be given internally, and I think a little hot brandy and water, even to children, is preferable to physic. It must be of course given with direction for a young child a teaspoonful of brandy mixed with seven or eight of hot water, and then a teaspoonful or two of the mixture give every quarter of an hour till the shivering subsides, for an adult half a glass or a glass of brandy to two of hot water may be given immediately, and repeated twice or thrice at intervals of a quarter of an hour, as may be needed. The patient should be quickly put to bed, covered with blankets, and warm bottles or hot bricks wrapped in flannel applied to the feet, for the purpose of re-exciting warmth.]

It is matter of dispute among surgeons, as to the propriety of administering opiates or other sedatives, an objection being made that the action of the opium interferes with the symptoms, so that it is impossible to determine whether the brain be affected by the irritation of the injury or by the action of the opium. I do not think this is matter of much consequence, but I am quite certain that soothing the patient's sufferings and dulling his nervous irritability, are most important indications in the constitutional treatment. Therefore I invariably prescribe landanum for an adult or syrup of poppies for a child, if there be any disposition to restlessness, and,

(a) Two cases of mortification resulting from burn, in which amputation was performed, are mentioned in the *Laneet* for 1840, 41, vol ii p 687.

If it continue, the opiate is repeated a few hours after sleep, even for a short period, is very great, and cannot be too strongly recommended, as during that time the stinging of the burn diminishes, and the patient suffers less. If sleep at night be deficient or much disturbed, I think it better to give laudanum in sufficient quantity to procure it, in less quantity it irritates and is hurtful, and this may be continued for some time, as may be found necessary.

In severe burns and scalds sickness and vomiting very frequently occur after the accident, and require to be checked by brandy and laudanum, but when they continue it is to be considered a very unfavourable symptom.

Till suppuration is set up, which usually is established in forty or fifty hours, the patient suffers more or less from febrile excitement, cooling drinks and saline medicine in a state of effervescence may then be given, and light farinaceous food if the patient be disposed to take it, which, however, is generally not the case. But immediately suppuration, or the separation of sloughs commences, the constitution must be supported proportionally to their degree, easily digestible animal food is then to be taken, and beer, porter, wine, or brandy, in proportion to the patient's age, habits, the degree of suppuration and extent of the slough must be used. Care, however, must be taken that the patient be not overloaded with support, which is indicated by quickened pulse, heat of skin, restlessness, and flushing of the countenance. When such occurs, this treatment must be suspended, and it not unfrequently happens that under this excitement the suppuration is suspended, and effusion of water on the brain, indicated by drowsiness and stupor or irritation of the mucous membrane of the bowels, and watery purging set in, which are very dangerous, and frequently destroy the patient. If sufficient support be not given, typhoid symptoms come on, and the patient rapidly sinks from that cause.—J F S.]

102 In all burns in which there is suppuration, care must be taken, especially during cicatrization, that no unsightly scar be produced, the parts must be kept in their natural place, and the contact of neighbouring parts, as the fingers and toes, be prevented by layers of linen or charpie smeared with salve.

[A most important circumstance in reference to burns and scalds is the character of the scar, in those cases where the skin has been extensively destroyed, in consequence of not merely the uncontrollable disposition of the granulations to contract during the progress of cicatrization, but also of the contractile habit of the scar itself, long after the wound has healed, when it is presumed that no further attention to the case is requisite. And even though every precaution has been taken to guard against the effects of this contractility, yet very often do the most deplorable results ensue, not only as regards personal appearance, but also in relation to diminution and restriction of the motion of the limbs. "These contractions are," as HENRY EARLE (*a*) observes, "a source of blame to surgeons," but I cannot agree with him that even "in some instances, perhaps, such reproaches are merited, as much may be done to prevent them by proper and strict attention to position during the progress of the healing process," and, indeed, his own subsequent observation is a complete and satisfactory refutation of this statement, for, he continues, "frequently, however, such contractions do not depend on any inattention on the part of the surgeon, but are the result of a natural process which follows cicatrization, and which has often baffled all the efforts of art to control. This process consists in an absorption of the granulations on which the new skin has been formed" (p 97). The surgeon, therefore, is not blameable for the results of this natural process, which not merely follows cicatrization, but actually proceeds with it *pari passu*, or even commences before the formation of new skin, for the granulations, as HUNTER observes, "being endowed with such properties, they soon begin to contract, which is a sign that cicatrization is to follow. The contraction takes place in every point, but principally from edge to edge, which brings the circumference of the sore towards the centre, so that the sore becomes smaller and smaller, although there is little or no new skin formed" (p 483). Besides the contractile power of these granulations," he continues, "there is also a similar power in the surrounding edge of the cicatrizing skin, which assists the contraction of the granulations, and is generally more considerable than that of the granulations themselves, drawing the mouth of

(a) On Contractions after Burns or extensive Ulcerations, in Med Chir Trans, vol v

the wound together like a purse * * * This contractile power of the skin is confined, principally, to the very edge, where it is cicatrizing, and, I believe, is in those very granulations which have already cicatrized, for the natural, or original, skin surrounding this edge does not contract, or at least not nearly so much, as appears by its being thrown into folds and plaits, while the new skin is smooth and shining (p 484) Whether this contraction of the granulations be owing to an approximation of all the parts by their muscular contraction, like that of a worm, while they lose in substance as they contract, or, if they lose without any muscular contraction, by the particles being absorbed, so as to form interstices, (which I have called interstitial absorption,) and the side afterwards fall together, is not exactly determined, and perhaps both take place * * * After the whole is skinned, we find that the substance, which is the remains of the granulations on which the new skin is formed, still continues to contract, till hardly any thing more is left than what the new skin stands upon This is a very small part, in comparison with the first formed granulations, and it in time loses most of its apparent vessels, becomes white and ligamentous" (p 485)

From this constant tendency of scars to contract, even from the very beginning of their production, they almost invariably, when the wound extends over the bending surface of a joint, as, for instance, the front of the elbow, wrist, or ankle, produce gradual and permanent flexion to a greater or less degree, and, by the unconscious efforts of the patient to overcome this restriction, and the unyieldingness of the scar itself, the scar is lifted up from the surface on which it was originally formed, the elasticity of the surrounding skin being (if the expression may be permitted) presumed upon, so that it yields to the forward movement of the scar till, becoming tense, it can yield no further, whilst the scar assumes a thick web-like character, doubling on itself as it rises, and stretching from the upper to the lower member of the limb, its edge being rounded and usually thicker than the rest of its extent, so that it has an appearance very similar to the skinny expansion between the upper and fore arm of birds upon which the covert feathers are arranged

If the burn or scald have been on the chest it is not uncommon to find the skin on the front of the arm-pits dragged inwards by the transverse contraction of the scar, and the arms pinned to the sides The skin of the neck, also, is drawn down, so as to cause more or less deformity, and instances are not wanting where, if the burn or scald have extended on the front of the neck, the skin of the face has been pulled down, the lower lip more or less completely everted, and the lower jaw constantly depressed, except when the head is bowed forwards, which it is even sometimes permanently Indeed, I can fully admit the truth of H EARLÉ's statement — "I have known this gradual contraction draw down the chin upon the sternum, and approximate the shoulders so much as to cause a partial absorption of the clavicles, and completely alter the dimensions of the thorax" (p 98)

From what has been stated it is clear that, after destruction of the skin by severe burns and scalds, the contraction of the scar, as a natural consequence, may be expected, however careful the surgeon may have been in his endeavour to prevent it, and therefore he is not blameable

But it becomes a question, whether any thing can be done to set free the limb restricted in its motions, and sometimes rendered useless by the contracting scar Formerly the scar web has been cut through to the bend of the joint, which at the time permitted increased extension of the bent limb, but, as the wound healed, the contraction was reproduced I believe the whole of the webbed portion of the scar has also been removed, leaving, however, the small part which lay flat on the limb, but, when cicatrization had taken place, the contraction again appeared HENRY EARLÉ, therefore, "proposed to remove the whole cicatrix, and to endeavour to approximate the integuments from the two sides of the arm, which was to be kept extended on a splint, not only during the healing of the wound, but for a considerable time after the cicatrix had formed, until, indeed, those changes which I have above described had been fully accomplished By such practice I conceived that the contraction, which I knew must follow so extensive a wound, would take place in a lateral direction, and not in the long axis of the limb" (p 100) On this principle EARLÉ operated on a boy of six years old, whose fore arm was contracted to a right angle by the contracting web-like scar of a burn which he had suffered twelve months before He did not remove the scar entirely, but left it connected with the skin above, hoping it would adhere to the bared parts as far as it would cover, and so lessen the ex-

tent of skin required, but, in four days, it was found to have sloughed, not being sufficiently vascular to preserve its vitality. Directly after the scar had been detached at the operation, attempts were made to extend the arm, but "considerable resistance was met with from the forcible contraction of the flexor muscles, which had been so long accustomed to a more limited sphere of action, that they with difficulty admitted of any extension. By degrees, however, they yielded considerably, and the arm was brought nearly to a right line. When the arm was so extended, the extreme point of the cicatrix, which still remained attached to the upper arm, was deficient nearly three inches of reaching the part from whence it had been removed." The operation was performed on the 12th November, 1813, and on 20th December following the wound was healed. The splint was continued for six weeks longer, after which, the arm continuing straight, it was worn only at night for three months, and motion permitted, and, at the time of reporting the case, five months after the healing of the wound, EARLE says—"His arm continues perfectly straight, and he enjoys the free and perfect use of it as much as of the other" (p. 102).

I have recently performed this operation with modification in a very severe contraction. Up to the present time (March, 1845) it has succeeded equal to my most sanguine expectations, but months must elapse before the actual result can be obtained. The description of the proceeding will appear in the following account of the

CASE—E F, aged 21 years, a healthy country girl, her clothes set on fire twelve years ago, in consequence of which her shoulders, chest, and arms were very severely burnt, and she was confined to her bed for nineteen weeks, but the wound did not fully heal for some time afterwards. At first there was no contraction, but, soon after, the scar began to contract, the skin over the front of the chest being first drawn towards the right shoulder, so as to form a fold across and below the front of the arm-pit, a similar process followed on the left side, and both sides of the back also soon took on the same disposition. An incision was made through the fold on the right arm-pit soon after the contraction had taken place, but without benefit, and she has since remained in her present condition.

A large scar now occupies the whole front of the chest, involving the breasts, which are not developed, and of the very small nipples are scarcely perceptible among the coarse meshes which the intersecting transverse rays of the scar form, as they continue on either side, across and below the arm-pits to the middle of the upper arm, deepening the axillary fold by a thick skinny web, about an inch below the edge of each pectoral muscle, with a rounded thickened margin on which the cuticle is scaly, and the cutis crackly. The contracting scar draws the skin tightly on the upper and outer part of the limbs, in consequence of which the upper arms are almost closely tied to the sides of the chest. A large triangular web extends from the axillary web nearly to the radial side of the wrist of each fore arm, with a thick rounded edge confining the right arm at less than a right angle, and the left at about a right angle with the upper arm, beyond which neither can be extended.

Dec 7, 1844. The following operation was performed on the right arm, which I had purposed performing according to EARLE's method, but with complete removal of the scar, and with making a second long incision through the sound skin at a distance from the scar wound, so as to diminish the dragging of the skin in bringing and pinning the edges of the scar wound together, on the same principle, that of relieving tension, with which DIEFFENBACH makes incisions in his plastic operations. It will be seen, however, that I proceeded very differently, and much further.

By an incision through the sound skin on each side of the scar web, commencing through the scar on the front of the arm-pit, and terminating below the point of the scar on the front of the wrist, I removed the whole of the scar skin which bound the fore to the upper arm, producing a long gaping wound, the skin edges of which could scarcely be approximated. I then made a second cut from the outer edge of the wound, at the front of the elbow, carrying it downwards and outwards nearly to the outside of the wrist, so that it had a lance-like shape, pointed above and wide below, and, by partially dividing its cellular connexions with the fascia of the fore arm, freed it so as, without difficulty, to bring its inner edge in contact with the corresponding edge of the scar wound. I hoped, also, by detaching the slip that the skin on the outside of the arm, which I also separated from its subjacent connexions, might be shifted upwards, might participate in forming the principal cicatrix on the upper arm, and by its wavy direction from the arm-pit to the outside of the wrist,

might, when hereafter its contraction shall commence, render the drawing up of the fore to the upper arm less probable, as the scar, not being straight but wavy, would be of greater length, and, being unequally acted on, would ultimately become straight, though without shortening, so as to restrict the straightening of the fore arm.

Having proceeded thus far, I presumed I had done with the knife, and then attempted to extend the fore arm, but, having used as much violence as I thought advisable, although it was not much, I found not the least yielding, but the fascia around the front of the elbow-joint being rendered very tense and raised, I thought this might be the obstacle, and, therefore, having divided it carefully upon a director thrust beneath it, I repeated the attempt at extension, with no better success.

By the division of the fascia the muscles passing over the front of the elbow-joint were exposed, and when the hand was pulled on the *m. supinator, adi longus* becoming extremely tense, and seeming to be the principal resistant, I passed a director between its belly and that of the *m. flexor carpi, adialis longior*, and cut the former across. Nothing was gained by this, and I then, with the concurrence of my friend and colleague GREEN, passed a director under the tendon of the *m. biceps flexor cubiti*, and divided it as it crossed the front of the joint. Attempts, though not violent, at extension were then repeated, but, being unsuccessful to any material extent greater than a right angle, we determined to rely on passive extension, but not to be commenced at once.

In the course of the operation the internal and external cutaneous nerves were divided as they crossed the front of the elbow and each gave a smart shock to the patient. I may observe also that I very nearly divided the brachial artery by accident, as after the division of the tendon of the biceps, it started up, and the slight yielding which the fore arm had allowed, putting it on the stretch, had stopped its pulsation, so that it escaped me, although I had sought for it and for the median nerve, for the purpose of avoiding them, and I mistook it for a band of fascia and cellular tissue till the pull on the fore arm being discontinued, its pulsation returned and discovered its character.

The edges of the inner wound were now brought together and connected with seven twisted sutures, beginning from the wrist and pinning upwards, but there was considerable stress on the skin, so that I feared the pins would ulcerate through, and that adhesion would not take place, as the interspaces would not completely meet, but they together with the outer wound on the fore arm were supported with some adhesive circular straps.

The patient was then sent to bed, a wet cloth applied over the whole arm, and a circular bandage carried round her chest having been fastened to the head of the bedstead, to prevent her trunk slipping down, a bandage was wound round the wrist, and its ends, being carried down over the foot-board of the bed, a four-pound weight was attached, which pulled the hand so as to promote extension of the fore arm, by tring the flexing muscles, without giving the patient much pain. *B. tinct opii 3ss. ex mixt eamph stat.*

Dec 8 She had passed a tolerable night, and when seen this morning was free from pain, the weight not pulling heavily, and she is without fever. Towards night she was very restless, and the arm becoming very painful and uneasy from the pull upon it, the weight was removed. *B. morph mur gr ss stat*, which was given at 2 A.M.

Dec 9 After taking the sedative she had a good night, but is feverish this morning, her pulse quick and skin hot. The weight was reapplied, and the uneasiness seeming to have depended principally on the slipping to the arm-pit, of the bandage confining the trunk, it was readjusted.

Dec 10 She could not go to sleep till the weight was removed, but afterwards passed a good night without taking any sedative, and is tolerably well. The dressings and pins were removed, each strap of plaster being replaced by another before a second was removed. No union at any part of the edges of the wounds, which are angry, most of the pins had nearly ulcerated through, and the remaining bits of skin by which they held are sloughy. The weight was reapplied, but is to be removed as often as the pulling becomes painful. There does not appear any material increase of extension. She is to have a couple of eggs daily.

Dec 13 Has continued going on well, but, last evening, being restless, she took *morph mur* as before, and had a tolerable night. Her bowels have been relieved this morning with castor oil, she is altogether comfortable and has a good

appetite. The arm was dressed to-day with adhesive plaster, the sloughy edges are cleaning and the discharge is healthy, but the skin about the elbow is very loose. The fore arm is certainly more extended, though not considerably. Is to be dressed daily; and the extension kept up with the weight as she can bear it. To have a mutton chop to-morrow.

Dec 20 Has been improving since the last report, the wounds are granulating kindly and the edges of the skin becoming adherent. The fore arm has been gradually coming down, and now forms, with the upper, an angle of 135°.

Dec 24 The extension of the arm still continues increasing. The wounds are healing, but in front of the elbow and above it there is still a pretty large patch of granulations. She seemed so well that I thought she might get up, and directed that the extension should be persisted in, by tying a four-ounce weight to her hand, and leaving it to hang unsupported by her side for ten minutes or a quarter of an hour frequently during the day as she could bear it without much distress. This weight, however, was rather more than she could manage, and a medicine-spoon, about half the weight, was used instead, and was found quite sufficient to tire the muscles and keep up the extension. Is to have a pint of porter daily.

Jan 24, 1845. Has been going on well, and is capable of carrying the spoon for a greater length of time without annoyance, the wounds much diminished and still granulating kindly. She was yesterday attacked with slight headache, and is to day feverish and has a quick pulse. *B pulv rheu c hydr 3j stat*

Jan 25 Tolerably well again, and the wound not disturbed.

Feb 26 Still going on well, the wound healing slowly, the arm still straightening, and as she has not yet made any attempt at bending, it is pretty stiff. I therefore desire that she should begin to do so, and also that she should carry occasionally heavier weights, which, indeed, she is disposed of her own accord to do.

March 7 Is beginning to bend the elbow a little, and since the last report carries with the right hand a two-gallon can of beer up a flight of stairs with little trouble. Is to exercise her arm by pulling a weight over a pulley fixed above her.

March 11 The long wounds upon the fore arm are all but healed. Upon the inside of the upper arm from the elbow upwards is a granulating wound, about two inches long and an inch and a half wide, which is granulating kindly, but its healing seems retarded by the pull of the broad scar which deepens the back edge of the arm-pit. This I propose soon to set at liberty, by cutting vertically through its connexion with the trunk, and inserting a piece of skin from the back.

In mentioning this case it must not be supposed I consider its success decisive, whether it be so or not requires many months to prove, and depends, I believe, considerably on the favourable result of the proposed plastic operation. It has, however, gone on so very satisfactorily, that I have ventured to relate it here, and I hope in a future part of this work to mention the result — J. F. S.

Professor MUTTER (a), a very intelligent surgeon of Philadelphia, has proposed the performance of plastic operations for the relief of deformities from burns, and has thus operated successfully in six out of seven cases, the first three of which he has published. All these were cases of forward contraction of the neck, with depression of the lower jaw, and eversion of the lip. His operation consisted in cutting across the middle of the scar, commencing in the sound skin on one and terminating in the sound skin on the other side of the neck, so that it was "about three quarters of an inch above the top of the sternum," * * * his object in making it so low down being "to get at the attachments of the sterno-eleido-mastoid muscles," both of which it was necessary to divide in the first, and one only in the second case, before the head could be raised to its natural position, but the head could be raised without dividing either, in the third case. A large gap was thus formed, into which was inserted a corresponding flap of skin, raised from the side of the neck, and from the deltoid muscle, without detaching it above, and fixed by several twisted sutures and adhesive straps. The edges of two-thirds of the wound on the shoulder were approximated with twisted sutures, and over the remainder, which could not be covered by the skin, a warm water pledget applied. The head was kept back by a bandage, and the patient then put to bed. She was not permitted to take "any kind of nourishment, in order that adhesion or union by the first intention might be ac-

(a) Cases of Deformity from Burns successfully treated by Plastic Operations, Philadelphia, 1843 8vo. Also, in American Journal of Medical Sciences, July, 1842.

complished," till the third day after the operation, and then only a few spoonfuls of barley water every hour or two. On the third day after the operation the dressings were removed, "the wound found united, with the exception of here and there a point and a small pouch of pus at the most depending part of the flap," which was punctured and the pus evacuated. Some of the pins were removed, and fresh straps applied. This, the first case, succeeded admirably, and the history of the other two which he has published, were nearly counterparts of it. After the incision had healed, the head was supported by "a stiff stock on which her chin rested, and this instrument also served to press the integument back, by which the natural excavation or depth of the neck, in front was readily effected."

With the view of determining the propriety of the operations, such as those reported by him, MUTTER makes some very interesting and valuable observations on, "1st, the nature of the tissue to be divided or removed, 2dly, the thickness or profundity of the cicatrix, 3dly, its location, 4thly, its extent, 5thly, its age, and, 6thly, its peculiar deformity"]

When large burns scar, there not unfrequently arises abdominal disorder, and frequent watery evacuations, which must not be suppressed

III --OF FROST-BITE

Anweisung, alle erfrorenen Glieder aus dem Grunde zu heilen, auch dann noch, wenn sie seit mehreren Jahren erfroren sind 2d Edit Pirna, 1804 8vo

OTTENSEE, J C , über die grundliche Heilung der Frostbeuten, in von SIEBOLD's Chiron , vol ii p 129

THOMSON, JOHN, M D , Article—*Frost-bite*, in his Lectures on Inflammation, p 613

DESMOULINS, De la Gangrène par Congélation Paris, 1815

MORNAY, Sur la Gangrène des Extrémités par Congélation Strasbourg, 1816

LARREY, Mémoire sur la Gangrène sèche causée par le Froid, ou Gangrène de Congélation, in Mem de Chirurgie Milit , vol iii p 60

103 In *Frost-bite*, (*Congelatio*, Lat , *Eisfrierungen*, Germ , *Congélation*, Fr ,) the severe and continued cold produces numbness of organic parts, so that sensation and motion are diminished, and, if its influence be continued, all sensation and motion are lost, the pulsation of the arteries ceases, and death ensues in consequence of which the part is shrivelled and dried (1) If the whole body be subjected to such influence, the skin becomes gradually pallid and insensible, from the collection of blood in the internal parts especially in the brain and lungs, arise anxiety, weakness, disposition to sleep, and, if these symptoms occur and the cold continue, death is the result (2) This particularly happens after the use of spirituous drunks without sufficiently active exercise

[(1) The parallelism of the effects of great degrees of heat and cold upon the animal body is very remarkable, for, though the causes are so opposite and unlike, yet are their results precisely similar, in almost whatever degree they are applied. Thus heat and cold produce only agreeable sensations when not advanced beyond a certain degree, but, if exceeding that, then both become painful without, however, exciting inflammation. A further degree of heat causes vesication, without death of the part, by merely exciting at first sufficient inflammation, or at least sufficiently increased action, to produce immediately the effusion of serum necessary to the formation of a blister. An increased degree of cold acts differently, inasmuch as its primary effect is to suspend the passage of the blood through the vessels, whence arise the blueness and puffiness of the cooled part, which is still painful, and has its motions restricted. But, if the cold be continued, the part becomes pallid, or yellowish-white, as if the blood were squeezed out of it, and its vessels emptied, the pain now ceases, the part becomes numb and motionless, but it does not vesicate

When the coldness subsides, the heat not only returns, but exceeds the natural standard, the pain also recurs and becomes more severe, inflammation being thus set up, its termination depends on the mode of treatment followed out. A still greater degree of heat or cold produces mortification, which, when depending on heat, except in the very rare cases where the part is actually incinerated, is most commonly, and at once, superficial, even in burns which are always more severe than scalds. But mortification from severe cold is almost invariably of the whole mass affected, rarely seems to be produced immediately, at least not in this country, but requires the lapse of several hours for even its appearance, and many more before the whole extent of the injured part declares itself dead, the mortification, if of the extremity, commencing with the tips of the fingers and toes, and gradually creeping up so far as the vital powers have been either totally extinguished, or have been so disturbed as to be unable to resolve the inflammation, depending on either the congestion of the vessels, or their acquired imperviousness, into the natural condition of the part — J F S

MULLER (*a*), in drawing a comparison of the effects of heat and cold on the body, observes — “Both can produce as well a disturbance of the excitability as irritation, inflammation, and mortification. A sudden violent operation of cold upon warm animal parts acts destructively. An extremely cold state is painful, and then numb. In still greater degrees, mortification, local death ensues. In less degree cold, destroying by abstracting heat, produces symptoms of inflammation and irritation in the efforts made by the parts for restoration of their equilibrium. In a moderate degree cold operates momentarily as an excitant, thus, cold water at once reddens the skin, as I have myself experienced in bathing in the river in October, but this was only momentarily, and slight signs of internal disturbance from the abstraction of heat ensued. Cold water, also, in fevers, with a very hot, dry skin, acts often meditately as an enlivening stimulant, and produces that turgor on the skin which warmth excites in cold parts. The secondary effect of continued cold is always a disturbance of the nervous system. The gradual operation of cold up to a high degree throws man into a condition of seeming death, and hibernating animals into their winter sleep by withdrawing their irritability, whilst a great degree of warmth gradually, also, disturbs the functions of the nervous system, but probably by a change, and in sandy deserts, where there is at the same time want of water, produces asphyxia, and causes the summer sleep of amphibians, and of the turtle in hot climates” (vol 1 p 86)

The length of time, during which a part remains cooled, has material influence in regard to its immediate mortification, its deferred mortification resulting from the degree of inflammation excited by the cold, or simply to its inflammation which resolves without mortification. This is proved by HUNTER’s experiments in freezing rabbits’ ears (*b*). In one case “the ear remained in the mixture (of salt and ice) nearly an hour, in which time the part projecting into the vessel became stiff, when taken out, and cut into, it did not bleed, and a part being cut off by a pair of scissors, flew from between the blades like a hard chip. It soon after thawed, and began to bleed, and became very flaccid, so as to double up on itself, having lost its natural elasticity. When it had been out of the mixture nearly an hour it became warm, and this warmth increased to a considerable degree, it also began to thicken in consequence of inflammation, whilst the other ear continued of its usual temperature. On the day following, the frozen ear was still warm, and it retained its heat and thickness for many days after” (p 123)

I have already mentioned the case of sloughing of the scrotum following the continued use, for a few hours, of ice to further the reduction of a rupture. We have in St Thomas’s Museum, also, the cast of a soldier whose scrotum having been frost-bitten in Flanders, during the campaign in 1793, under the Duke of York, both testicles, and a portion of the spermatic cord, were exposed, and long remained without skin, though completely covered with granulations.

Actual frost is not absolutely necessary to produce mortification, cold wet is quite sufficient if continued sufficiently long to reduce the natural heat of the part below a certain standard, and there retain it, as will be presently seen in a case of mortifica-

(*a*) Handbuch der Physiologie

(*b*) Observations on certain parts of the Animal Economy London, 1792 4to 2d Edition

tion of the hand from laying out hides, and this more especially when evaporation is going on quickly —J F S

(2) The interesting account given by Sir JOSEPH BANKS (*a*), of the sufferings of himself, of Dr SOLANDER especially, and other of their companions, from exposure to cold is well known, and is quoted by THOMPSON, (p 619,) who also mentions (p 620) another remarkable case of Dr KELLIE's, which had been previously reported (*b*)]

104 When a limb or active body becomes frozen, the living activity is depressed by the torpidity of the juices, a state of asphyxia is present, which is yet susceptible of reanimation, but which, if left to itself, must necessarily run into gangrene or death Those parts are most commonly affected by the dangerous effects of cold which are most distant from the heart, and in which the evolution of warmth, under natural circumstances, is slight, as the hands, ears and nose, especially if the circulation through them be hindered by accidental pressure

HUNTER (*c*) observes that, in frost-bite, "the effect of the cold is that of lessening the living principle. The powers of action remain as perfect as ever, but weakened, and heat is the only thing wanting to put these powers into action, yet that heat must at first be gradually applied and proportioned to the quantity of the living principle, which increasing, the degree of heat may likewise be increased. If this method is not observed, and too great a degree of heat is at first applied, the person or part loses entirely the living principle, and mortification ensues" (p 137)

ASTLEY COOPER (*d*) says —"In this climate, destruction of the life of the part does not, in general, immediately succeed" the application of a great degree of cold for a considerable time to a part, but "the part will become numbed, that is, its nervous power will be diminished, and, when it is thus enfeebled, it will be unable to bear a very slight degree of inflammation, and the destruction of its life follows * * * It generally happens that inflammation succeeds the application of cold after an interval of two or three days" (pp 215-16)

LARREY (*e*) does not consider, in frost-bite, "the cold as the determining * * * but merely the predisposing cause" of mortification, and observes, in support of this opinion, that, at the time of the battle of Eylau, the French soldiers "did not experience any painful sensation during the severe cold (varying from 10° to 15° below zero of REAUMUR's thermometer) to which they had been exposed on the night-watches of the 5th, 6th, 7th, 8th, and 9th of February, 1813, and that it was not till the night of the 10th, when the temperature had risen from 18° to 20°, (a great quantity of sleet having fallen," as he mentions previously, "on the same morning, and been the forerunner of the thaw which took place in the course of that day, and continued in the same degree for several days,) that they felt the first effects of the cold," and "applied for succour, complaining of acute pain in the feet, and of numbness, heaviness, and prickings in the extremities. The parts were scarcely swollen, and of an obscure-red colour. In some cases, a slight redness was perceptible about the roots of the toes, and on the back of the foot, in others, the toes were destitute of motion, sensibility, and warmth, being already black, and, as it were, dried" (pp 60-2) LARREY's objection to the cold being the determinate cause of the mortification, is not borne out by this account, for it is well known that the cold produced during a thaw is much more severe from the accompanying evaporation, than whilst freezing continues. It may be also observed, that a greater degree of dry cold than of wet cold can be borne without inconvenience or danger, as our daily experience proves in dry frosty and cold wet weather —J F S

The two following cases, for which I am indebted to my friends and colleagues GRERY and SOLLY, under whose care they were, present good examples, the first, of the usual result of frost-bite in this country, and the second, of mortification from continued application of cold moisture in an excitable constitution, arising from the use of beer and spirit —

(*a*) Captain Cook's Voyages, vol II Hawkesworth's Edition

(*b*) Duncan's Edinburgh Medical and Surgical Journal, vol 1 Edinburgh, 1805

(*c*) As just quoted (*d*) Lectures on Surgery, vol 1 (*e*) As quoted above

CASE 1 — J W , aged thirty-nine years, was admitted into St Thomas's Hospital Dec 15, 1829 He has followed various occupations, but has, in general, lived poorly, and has now mortification of both feet, of which he gives the following account —

About a month since, being very destitute, he lay for four successive nights in the open air, at which time the weather was very cold On the morning following the fourth night, he found himself, on rising, unable to stand from loss of sensation in his feet, and unconsciousness of touching the ground He was removed by the police to Cold Bath Fields' Prison, where he states that, for some time, he was fed on gruel and on soup on alternate days Soon after his arrival at the prison, the numbness of his feet was succeeded by a warm prickling stinging heat, and this soon followed by redness, swelling, and throbbing of the parts He does not remember what treatment he was subjected to, but these symptoms, accompanied with great pain, continued for eight days, after which, in the course of a single night, both feet mortified, assuming an ashy-black colour, and here and there having small vesications Simultaneously with this change, the pain remitted, and, in a day or two after, the line of separation between the dead and living parts appeared He continued in the prison infirmary, the separation advancing, and his health varying but little, until his admission here

The entire soles of both feet, and the front of both as far as the tarso-metatarsal joints, were completely mortified A line of healthy granulations divided the living from the dead parts in both feet nearly alike, in both, commencing from the metatarsal bone of the great toe, it crossed the bases of the other metatarsal bones to the outer edge of the foot, along which it stretched backwards beneath the outer ankle, around the heel inwards, and thence forward to the base of the great metatarsal bone The sloughs were very offensive, and he complained of great pain and want of sleep Pulse 90, feeble, appetite good, bowels confined, tongue moist and slightly furred Rx ammon carb gr v conf aromat qd tinct opii gr i mist camph ssjss gtrs He is to have meat, with half-a-pint of porter, sago, with a glass of port wine daily The feet are to be wrapped in rags steeped in lot calc chlor, and a poultice to be applied over

Dec 16 Has had a restless night, has a quick full pulse, headache, and a furred tongue, probably from repletion, he having been allowed to take meat, porter, sago, and wine at once, and his bowels being unmoved The meat was, therefore, ordered to be discontinued, and a dose of mist senn comp to be taken immediately, and repeated three hours after, if necessary

Dec 19 Has been relieved by the clearance of his bowels, and is better, but he complains still of want of rest Omit mist R opii gr t d

Dec 22 Still complains of great pain, but the separation is proceeding rapidly, and the dead parts seem held only by two or three of the metatarsal bones

Dec 26 To hasten the cure, it was thought advisable to remove the right foot, which having separated at the tarso-metatarsal joint of the great and little toes, the three middle metatarsal bones were sawn through about half-an-inch from their base, following the line of demarcation The knife was earned along the sole of the foot, dividing two tendons, to the heel-bone, the tuberosity of which was divided by ulcerative absorption, and, with a few slight touches of the knife, the whole of the mortified parts were removed A slight arterial bleeding occurred at the heel, but was soon arrested by pressure A poultice applied Rx ammon carb gr viij conf aromat ssjss mist camph ssjss gtrs op gr i sexta quaque hora

Dec 28 The left foot removed nearly as the right, but the three inner metatarsal bones, and the tuberosity of the heel-bone required sawing through

Jan 25, 1830 Continues improving in health, cicatrization goes on slowly Omit mist R opii gr i quin sulph gr ij ext gent comp gr iiij tcr in die, a pint of porter daily

Feb 8 Cicatrization in the left foot has proceeded rapidly, the stump having nearly skinned over, but, on the right foot it is tardy, and the exposed part of the heel is about to exfoliate

Feb 28 The exfoliated bone was removed

April 3 The left stump is healed The right has varied a little, according to the state of his health, but to-day three dark spots, corresponding to the points of the sawn-off metatarsal bones, have appeared By the beginning of

October, A very indolent ulcer occupied the plantar surface of the remaining part

of the foot, and, showing no disposition to heal, amputation is talked of. Superficial indolent ulceration of the extreme part of the left stump had taken place, but seems now disposed to improve

Dec 10 The right leg was amputated, by the circular incision, below the knee, and three ligatures applied

Dec 14 Stump first dressed, going on well

Jan 2, 1831 The wound nearly healed, but the ligatures have not come away. They separated, however, on

Jan 4, One, on 10th, one, and on 13th, the last came off

March 30 The ulceration on the left foot, which, at the time of the amputation, was only as large as sixpence, circular, and surrounded by a hardened edge, has recently spread over the whole sole, without any obvious local or constitutional cause

June 1 The ulcer healing, but not reduced to its first size Amputation was proposed, but declined

CASE 2 —T B, aged thirty years, a tanner, was admitted

Feb 3, 1845 He has been accustomed to live freely, and taken largely of beer, with the addition of spirits occasionally, but has enjoyed good health till within the last three months, in which he has headache, and been under the care of the out-patient physician, by whom he has been cupped on the neck and purged freely, but without benefit

On the 24th of last month he was engaged, under cover, during a cold day laying out fresh hides till dinner-time, an occupation which kept his hands continually cold and wet His dinner did not occupy him ten minutes, and his hands during that time having continued still cold, he returned to his work, and for five hours during the afternoon was engaged cutting off the horns from the hides, whilst he held the latter in his left hand Towards the latter part of the afternoon he felt cold all over, and, when he had returned home, feeling his left hand very cold, and being unable to straighten his fingers, which had stiffened as he held the skins, but neither the fingers nor hand were yet discoloured He put his hand into lukewarm water, but could not bear it immersed on account of the great pain excited, which was also brought on by holding the hand to the fire Indeed, he was only easy when the hand was cold, and could not even bear it beneath the bed-clothes, but was obliged to keep it out upon the counterpane Before putting his hand and arm into warm water, there was not any apparent change in colour, but, after the first and every succeeding dipping into warm water, the hand became red and redder, and more painful

On the 25th ult, when he awoke in the morning he noticed the nails were blackening about their roots, but he was free from pain, though the hand was very cold and numb, and was not prevented going about a little job

On the 26th he again tried immersion in warm water, but the pain recurred, and the terminal joints of all the fingers and thumb had now become black The mortification continued spreading, repeated applications of warmth always excited pain, and he was more easy in proportion to the part being kept cold

On the 30th the mortification, having continued along the fingers, just entered the palm, and he began to suffer constant pain

On Feb 2, the hand had mortified up to the wrist, the pain was so gnawing and severe that he could not rest, and was accompanied with severe headache He applied to a medical man, who bled him twice in the same day from the ailing arm, but did not get more than a pint of blood, and ordered warm applications

Feb 3 During the last night the gangrene had extended about one-third of the fore-arm upwards, has a dark colour, which terminates abruptly, is perfectly cold and insensible He complains of pain in the head, aching and weariness of the limb, loss of rest at nights, general weakness, and failing appetite, he suffers much from thirst, his tongue covered with white fur, and the bowels confined, pulse 120, regular and weak, but perceptible at both wrists A dose of infusion of senna with sulphate of magnesia was ordered forthwith, meat, and a pint of porter daily, warm fomentations and linseed-meal poultice to be applied to the hand

Feb 4 Altogether more comfortable The bowels have been freely relieved, his tongue is cleaner, and the headache lessened Is to have four ounces of brandy and two pints of porter daily

Feb 5 Is much the same, but feels very weak, though his appetite is improving

No pulsation can to-day be felt in the wrist of the ailing arm. The heart was carefully examined to-day, and its action and sounds ascertained to be natural. Is to have a mutton chop and two eggs, with three pints of porter, daily. *B tinct opn myxx sp ammon comp 3j ex mist camph 6tis*

Feb 15 The gangrene has not spread since the last report, the line of demarcation between the living and the dead parts is now apparent, and some vesication has occurred round the arm. The ulcerative process has continued steadily, and has now,

March 8, completely passed through the soft parts down to the bones, forming a regular well-shaped stump, the whole of which is granulating kindly. The gangrenous part has much the appearance of brown paper, and, though a little shrivelled, keeps its form, but is very offensive. It was therefore thought advisable to saw through the dead bones and remove it, which was done accordingly. His health has been steadily improving, he has scarcely had an untoward symptom, his head only aching occasionally, he sleeps well, and enjoys his food.

March 31. Wound cicatrizing, and there seems every prospect of his doing well.]

105 If a part frozen or benumbed by cold be too suddenly warmed, severe inflammation is the result, the part swells, becomes red and blue, and active throbbing pain ensues—*chilblains*, pouring out of fluid into the cellular tissue, suppuration, and, in actually frozen parts, *gangrene*. Corresponding appearances occur on the whole body if warmth be applied after exposure to severe cold, the skin swells, becomes red and painful, red spots, gorging with blood in different parts, and, in consequence, swimming of the head, swooning, spitting of blood, inflammation of the lungs, and so on. The hasty warming of a thoroughly benumbed body produces death and rapid putrefaction.

[ASTLEY COOPER observes on this point—"Great care must be taken in these cases not to apply heat very suddenly, even the common heat of the bed frequently occasions inflammation, which is extremely liable to gangrene, in consequence of the diminished nervous influence of the part" and he mentions the case of a person who "had been shooting, and had exposed himself to severe cold, and finding his feet benumbed on his return, he immediately put them into warm water. The consequence was that a gangrene took place, of which, notwithstanding every care, he died" (p 216). LARREY also observes that those soldiers who had been exposed to severe cold, and had opportunities of warming themselves, suffered most. The cases just related confirm these statements.]

106 In reanimating a frozen person we must always commence with the lowest degree of warmth. The frozen person should be brought into a cold room and covered up (after he is undressed) with snow or with cloths dipped in ice-cold water, or he may be laid in cold water, so however that his mouth and nose are free. When the body is somewhat thawed, there is commonly a sort of icy crust formed around it, the patient must then be removed, and the body washed with cold water mixed with a little wine or brandy. When the limbs lose their stiffness and the frozen person shows signs of life, he should be carefully dried, put into a cold bed in a cold room, scents, and remedies which excite sneezing, are to be put to his nose, air is to be carefully blown into the lungs if natural breathing do not come on, clysters of warm water with camphorated vinegar, tickling the throat with a feather, dashing cold water upon the pit of the stomach. He is to be brought by degrees into rather warmer air, mild sudorifics, elder and balm tea, with solution of acetate of ammonia, warm wine and so on, are to be given, in order to cause gentle perspiration.

107 In a similar way a frozen limb is to be thawed, it is to be rubbed

with snow or dipped in cold water, till sensation and motion return, when it may be washed with camphorated spirit, brandy, petroleum or essence of amber, cold, mild sudorific tea may be given to the patient, who is to be put to bed in an unwarmed room, with a view to keeping up a gentle perspiration for several hours

Frozen parts must always be handled with care, and no violence used, because they easily break

108 When by hasty warming a frozen limb becomes much swollen, painful, red, blue, or in some parts even black and shrivelled like a mummy, and to outward appearance is mortified, it may, however, still be oftentimes recovered by the application of cold, and by gradual transition to warmth. But, if mortification have already taken place, its usual treatment must be employed. If superficial, the slough separates, but, if the whole mass of the limb be affected, so soon as the mortification is defined, amputation must be performed.

In many cases the mortified limb drops off, of itself, or the bone only has to be sawn through at the point of demarcation. It does not, however, follow that in this mortification amputation is to be rejected. My own opinion is to the fortunate results of amputation performed at the proper time, and the disadvantage of delaying it, agree with those of LARREY (a)

109 *Chilblains* (*Permone*, Lat., *Frostbeulen*, Germ., *Engelwurz*, Fr.) are erysipelatous inflammations of the skin, which, according to their degree, are accompanied sometimes with slight swelling and sensation of heat and pricking, which after a little time often subside of themselves. Sometimes they are connected with considerable dusky-red or bluish swellings and severe pain, sometimes with excoriation, arising from little blisters or risings of the skin, and are often converted into wide-spreading obstinate sores. Chilblains may also, by great neglect, become mortified. They produce, only in winter, especially in change of weather, annoyances which are often great, and even interfere with the use of the limb, but, in summer, they subside. In any dyscrasy of the body they often assume a corresponding character.

HUNTER mentions "another inflammation very like chilblains, which is not very lively and is often in blotches, some the breadth of a shilling, others of the breadth of half-a-crown, and even broader, &c. This inflammation certainly arises from irritable debility, the blotches look more of a copper colour, and the skin over them is often diseased" (p 265). I have seen this appearance several times, and, in two or three instances, long streaks in the course of the superficial veins of the same character — [J F S]

110 Chilblains usually occur in young weakly persons, and women who are not accustomed to cold, have a sensitive and delicate skin, most commonly on the feet, hands, ears, nose, and lips, by a sudden alternation of cold and heat, especially if the part be moist and sweating. In many persons there seems a peculiar disposition for their production.

111 The treatment of chilblains of a mild kind consists in frequently rubbing them with snow, in repeated washing with ice-cold water, with brandy and water, camphorated spirit, lead wash, vinegar, acetate of ammonia, solution of hydrochlorate of ammonia, tincture of amber, diluted hydrochloric or sulphuric acid, petroleum, oil of turpentine, a mixture of rectified spirit of ammonia and laudanum, nitric acid with

(a) As above, 72

cinnamon water, solution of chloride of lime and so on If they are very painful, more soothing remedies must be employed, leeches on the diseased part, cocoa, butter, deer-suet, poultices of chamomile and elder flowers, of rotten apples, bruised houseleek, various softening ointments, smearing with warm glue, and so on Rubbing in soap liniment with a portion of tincture of cantharides upon the chilblain once or twice a day and keeping it warm, and, if it be ulcerated, the rubbing is to be applied in the immediate neighbourhood (a) The diseased part must be kept warm and quiet during the employment of these remedies

[One of the best stimulants for chilblains is our hospital mustard liniment, consisting of one ounce of flour of mustard to a pint of turpentine —J F S]

112 Ulcerated chilblains require drying salves, lead ointment, zinc ointment, with myrrh, camphor, opium and Peruvian balsam, ied precipitate of mercury ointment, and, if the flesh fungates, it must be touched with lunar caustic In old sores of this kind, issues must be employed before they close and, if connected with any general disease, it must be properly counteracted Many speak favourably of electricity

Gangrenous chilblains must be treated after the general rules

113 The occurrence, as well as the recurrence of chilblains, must be guarded against by accustoming oneself to the cold, by avoiding warm coverings, and all hasty warming of cold parts, by frequently washing with cold water, and afterwards brushing and carefully drying them

IV —OF BOIL OR FURUNCLE

BERLIN, Dissert de Furunculo Gottingæ 1797

HEIM, Erfahrungen über die Furunkeln, in HORN's Neuen Archiv, vol vii p 151

JOURDAN,—Article, *Furuncle*, in Dictionn des Sciences Medicales, vol viii

ALIBERT, Nosographie des Dermatoses, vol 1 p 221 Paris, 1832 folio

DUPUYTREN, in Leçons Orales, vol iv p 109

COPELAND JAMES, M D,—Article, *Furuncular Diseases*, in his Dictionary of Practical Medicine, vol 1

114 The *Boil or Furuncle* (*Furunculus*, Lat , *der Blutschwar oder der Funinkel*, Germ , *Furoncle*, Fr) is a hard, bounded, deep red, raised and very painful swelling, situated in the sebaceous follicles of the skin, occurring on all parts of the body, and usually terminating in suppuration

A slight pain first attacks some part of the skin, and a little swelling appears, which, as the pain increases, becomes elevated, hard, and of a deep red colour, and attains various degrees of size, rarely, however, exceeding that of a pigeon's egg In delicate persons, and in children, or, if the boil be seated in a sensible part, febrile symptoms often arise, loss of sleep, want of appetite, convulsions and so on The swelling becomes white at the top, it breaks, some pus mixed with blood is discharged, and then the bag of the gland together with the destroyed cellular tissue is thrown off like a grayish-white core, or *set-fast*, as it is vulgarly called, (*Eiterkopf*, Germ , *Bouillon*, Fr) after which the surrounding hardness subsides

(a) WARDROP, in Medic Chirug Trans , vol v p 142

The sebaceous glands of the skin are not contingently attacked by the inflammation in boil, if the furuncular inflammation of the cellular tissue occur in its neighbourhood (WALTHER,) but the sebaceous glands are originally the seat of the inflammation, and from them the inflammation spreads into the surrounding cellular tissue, as is proved by the little hard knot out of which the boil is always developed. The boil is only one link in the changes of the sebaceous glands, produced by inflammation, and only a gradual variation from the pimples and red spots so frequent on the face. These pimples, the mere inflammation of the excretory ducts of the sebaceous glands, may be always easily removed and their passage into a little pustule prevented, if they be squeezed early, which discharges a tallow-like substance from the duct. As the pimples are connected with the boil, as inflammatory affections of the sebaceous glands and their ducts, so also the maggots (*commendones*) are plugs in the excretory ducts, and the little pearl-like, almost transparent vesicles, which often occur in great numbers on the face of persons with tender skin, and which, if cut into or pulled out, present a tallowy substance enclosed in a bluish-white bag beneath the skin, to the sebaceous tumours—as chronic changes of the sebaceous glands.

[GENDRIN (a) denies that cores are sloughs, but says they are morbid secretions or pseudo-membranes, the product of the inflammation of the inter-areolar cellular processes, and that they consist of a viscid semi-transparent homogeneous yellowish-white substance without any vessels and without the least trace of organization (p. 19.)

Boils are divided by ALIBERT (b) into four kinds, each presenting special characters. 1 The Common Boil (*Furoncle Vulgaire* or *Clou*) described above. 2 The *Wasp's-Nest Boil* (*Furoncle Guépier*) is also described by some the *Malignant Boil*, and by others the *Mild Carbuncle*, though they only described *Malignant Carbuncle* the two diseases, however, appear to ALIBERT decidedly distinct, and justify their separation and the arrangement of the so-called mild carbuncle with boils, of which, indeed, it is merely an agglomeration, indicated by a hard tumour surrounded with a red and inflamed zone, and having its top covered with one or more vesicles which show its serous character—the pain is severe, the heat pungent and burning, pulsation and fluctuation are soon felt, the skin thins, and, numerous perforations being formed, a kind of grayish sinuous skin separates in flakes, or may be removed in pieces, and the tegument covering the tumour separates during its course. This form of boil generally attacks the nape and region of the neck, sometimes extends to the back and rump, and even occasionally attacks the upper limbs. When the parts confining it are set at liberty, large ulcerations occur. It is generally critical, specially occurs after gastric and adynamic affections, rarely attacks other than elderly persons, and hence has been called *Old People's Boil*. According to MALVANI, its course is less quick than that of the common boil, it suppurates more slowly, for vesicles do not appear on it till the third or fourth week. 3 The *Pustular Boil* (*Furoncle Panule*) is a slightly elevated but wide swelling similar to a pustule. It is accompanied with pain distention, and often with slight fever. It proceeds very slowly, requiring many months, and even a year to bring it to perfection. The aperture on its top resembles that of a weaver's shuttle, subsequently the boil dries up, and, if scratched, fills into powder. It occurs in all parts of the body, and, on its subsidence, leaves an eechymosed spot, similar to that which ushers in its appearance. Its tip is generally red, hard, very thinning, and gives place to a slight serous evadation, which ceases for some time, is repaired at intervals, but the hardness continues and is only resolved by furfuraceous scales. 4 The *Asthemic Furuncle* of Dr. COPELAND (c) (*Furoncle Atonique* of GUERSENT) (d) was described in the spring of 1823 by both those physicians. They agree in having observed it in children previously much weakened by disease, in persons who are subject to gastro-enteritis with adynamic symptoms, in latent pneumonia, during the course of small-pox, and so on, according to GUERSENT, and where the weakness has been caused by chronic disorder of the bronchi or asthenic inflammation of the substance of the lungs, according to COPELAND, who adds that coma generally comes on before death, in addition to the well-marked symptoms of adynamia noticed by him and GUERSENT. The eruption appears chiefly on the trunk, the lateral parts of the neck and thighs, but, GUERSENT

(a) Above cited, vol. 1. (b) Quoted at the head of the article. (c) Above quoted
(d) Du Furuncle Atonique, in Archives Générales de Médecine, vol. 1 Jan., 1823

says, more rarely on the limbs COPELAND states, that in the cases he has observed, "the number of furuncles has been considerable, not fewer than five or six, and in two cases they were about twenty GUERSENT's paper, however, does not lead to the supposition that in his cases the furuncles were numerous Both describe them to begin as circumscribed swellings, of little extent, but resistant to the touch, of a livid violet colour, but sometimes without any remarkable change in the colour of the skin In the second stage, a very small purulent phyletene appears on the top of the swelling, and, when it tears, the true skin shows beneath a little grayish patch, softened and perforated through and through like a common boil At first a bloody serous fluid exudes, the swelling softens, and the aperture in the skin enlarges, which in two or three days, and sometimes even in twenty-four hours, forms a perforation from five to six lines in diameter, completely round, and exactly like a hole which has been made with an auger During this time the swelling rapidly subsides The cellular tissue does not separate like a core, and rarely detaches some fragments The bottom of the ulcer presents a grayish sanious and dryish appearance, and whilst its edge is well defined, the surrounding skin, paler and softer than natural, is entirely separated from the cellular tissue to the extent of several lines This atonic furuncle very commonly follows leech-bites, the perforation in the skin then seems to have been made with a trocar, but this triangular form soon rounds as it spreads, and becomes completely circular, as if it had arisen spontaneously If the leech-bites have been grouped together, and each bite have given rise to a little furuncle, the skin after a few days appears perforated at every bite, and resembles a suppurating carbuncle, but with this difference, that there is neither fulness nor swelling, and that the holes are larger and more regular than in carbuncle, such as might be made by small shot The ulceration, which is the third stage of atonic boil, is generally indolent, in some cases, however, it is painful It remains stationary for eight or ten days, more or less, according to the general condition of the patient When the ulcer is disposed to heal, the cellular tissue becomes moist, brightens, and becomes slightly reddened, the skin gradually attaches itself to the subcutaneous tissue, some fleshy granulations rise from the bottom of the ulcer, the aperture in the true skin diminishes a little, and, as in all ulcers of the skin, a soft scar, slightly depressed, is produced, and which, in its extent only may be compared to that succeeding a large vaccine pustule" (pp 337, 8) In addition to these observations of GUERSENT, it is noticed by COPELAND that the cellular tissue is destroyed by rapid ulceration or phagedenie absorption, that the ulcers have no discharge nor any tendency to scab, that, in the two cases he examined after death, no attempts at reparation were visible in the ulcerated perforations, nor any injections nor inflammatory appearances in the margins the chief alterations were moderate emaciation, congestion, and injection of the membranes of the brain with slight serous effusion, congestion of the substance of the lungs, with limited hepatization in an early grade, patches of injection in the digestive mucous membrane, or other parts being pale, and enlargement of the mesenteric glands * * * The perforations are always uniform in character, although varying somewhat in size, they are peculiar and hardly ever modified from the state described, they appear analogous to the perforating phagedenie or atonic ulcers sometimes seen in the stomach (pp 1054, 55) GUERSENT further remarks, that "this disease is evidently allied to the boil in its first and second stages by its form and mode of opening the softening and sinking of the tumour after suppuration, and the absence of core, approximate it to certain kinds of atonic abscess, but the other characters do not permit their arrangement together Finally, it is distinguished from all other cutaneous inflammations by the round and regular form of the ulcer which succeeds it The kind of perforation has something specific, it can only be compared to the spontaneous opening of the atonic abscesses sometimes noticed on the sides of the neck, in which serous bad pus has long separated the skin before it softens it The opening of those abscesses, often very large, and increasing as rapidly as atonic furuncle, independently of their difference in the first stage, never exhibit those regular ulcers seen in atonic furuncle" (p 338)]

115 The boil often occurs in healthy persons without any apparent cause It frequently appears in convalescence after severe fever, is not unfrequently critical, after suppressed perspiration from neglect of cleanliness of the skin, in persons who live irregularly, during menstruation,

and in the spring Boils often appear, probably dependent on the state of the atmosphere, especially in young persons, in great number, at greater or less distance, in different parts, and are commonly accompanied with severe fever After the misuse of mercury, persons with deteriorated juices, syphilitic, scrofulous and scorbutic, are frequently subject to boils In these cases they are often chronic, attended with little pain and tedious in suppurating

116 The treatment consists in furthering suppuration, for which purpose, in very painful boils, softening poultices with the addition of henbane, bruised poppy heads, or, in moderate inflammation, roasted onions, flour and honey, the *empl de cicut c ammonaco*, the *empl diachylon comp* are used In most cases the boil opens itself, or it may be opened with the lancet, the slough or core separates, by the use of softening bread poultices, which should be continued till all hardness subsides If any hardness remain, it is usually only dispersed by a fresh inflammation and suppuration, which we must endeavour to excite If the boil be accompanied with very painful tension, this may be relieved and the entire course of the disease cut short by an incision throughout its whole length, and the use of softening poultices

[In treating boils, as in the treatment of carbuncles, it is certainly best to cut across them at once, freely and deeply, the momentary pain is severe, but the relief from the violent pain under which the patient suffers is almost immediate, the tension of the part is at once relieved, the cellular tissue being enabled to discharge the serum with which, intermingled with adhesive matter, it is loaded, and thus its destruction is arrested, and the increase of the core put a stop to, and not unfrequently even does it entirely disappear, so as to render it doubtful whether it have been formed Almost immediately after the slough or core has been thrown off, a very free flow of serum takes place from its boundary walls, and, in strong constitutions, within a few hours, the large hole from which the slough had escaped, and the surrounding swelling disappear, by the dropping down of the skin and cellular tissue to its own natural situation, leaving only an aperture in the skin which speedily seabs and heals It is a very common but very improper practice to use stimulants, either in the shape of poultices or plasters Generally moist warmth, kept up by poultices, by steaming, or wet flannel covered with oiled silk, is most grateful to the patient's feelings, but, in some cases, dry warmth, either with repeated hot flannel, or chamomile flowers in a flannel bag, gives most ease before the boil is opened —J F S]

117 General treatment in boils is rarely necessary, if connected with gastric impurities, or with acidity, as a cause, these must be corrected by suitable remedies in addition to the local treatment

RITTER has a one-sided notion of the origin of boils from retention of the animal refuse, and of their dispersion by the early application of cupping-glasses (a)

[I do not agree with CHELIUS that general treatment in boils is necessary when such is the case it is the exception, not the rule Most commonly the general health is disturbed, and requires putting to rights by attention to the hepatic functions, and the proper employment of tonics —J F S]

V —OF CARBUNCLE

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COPELAND, JAMES, on Furuncular Diseases, in his Dictionary

118 *Carbuncle* (*Carbunculus*, *Anthrax*, Lat , der *Karbunkel*, Germ , *Charbon*, Fr) is an inflammation of the skin and underlying cellular tissue, with considerable hard swelling, which runs into gangrene throughout its whole extent It is distinguished from boil only by the severity of the inflammation and by its great disposition to run into gangrene, and from malignant pustule (*par* 34), with which it has great similarity, and has been by many confounded, in that the latter is always the consequence of an imputed peculiar poison

Under an attack of severe burning pain, a circumscribed hard swelling is produced, on which numerous pustules arise , these bursting, many sieve-like holes are formed in the skin, from which bloody ichor escapes, and at the bottom of which mortified cellular tissue is seen , the skin grows dark, blue, or black, and quickly runs into gangrene Sometimes the deep parts are all in a state of mortification before it appears externally If the skin be destroyed by running together of several apertures, or by mortification, the dead cellular tissue appears as a whitish-gray lump, or, in large carbuncles, as a black, dry mass intermixed with grayish-white and bloody shreds, with great surrounding inflammation, which runs into suppuration, in which case, after the throwing off of the dead cellular tissue a large ulcer is produced, at the bottom of which muscles, tendons, bones and even more important organs, are laid bare The size of the carbuncle is very different, often as large as the hand, often still larger It usually occurs on the neck, between the shoulder-blades, upon the back and buttocks Fever very commonly precedes carbuncle, or accompanies it from the first, and is sometimes only slight, sometimes nervous, putrid and so on Hence arises the difference between *symptomatic*, *malignant*, *pestilential*, *idiopathic*, and *benignant* carbuncle

“The inflammation that produces the carbuncle is,” says J HUNTER, “of a different nature from any of the former, it is stationary with respect to place, and is pretty much circumscribed, even forming a broad, flat, firm tumour, it begins in the skin, almost like a pimple, and goes deeper and deeper, spreading with a broad base under the skin, in the cellular membrane, and, although considerably tumefied, yet this does not arise from the extravasation of coagulating lymph producing adhesions which are to retain life, for the very cells into which it is extravasated become dead It produces a suppuration, but not an abscess, somewhat similar to the erysipelatous, when the inflammation passes into the cellular membrane , for, as there are no adhesions, the matter lies in the cells where it was formed, almost like water in an anasarca; but still it is not diffused through the uninflamed cellular membrane, as in the erysipelatous, for it appears to extend no further than the inflammation One would almost imagine that there was a limitation to the extent beyond which this species of inflammation could not go, and at these limits the adhesive inflammation took place to confine the matter within the bounds of the carbuncle A diffused ulceration on the inside, for the exit of the matter, takes place, making a number of openings in the skin ” (pp 272, 3)

HUNTER's observations, that "there are generally more carbuncles than one at the same time, a great number succeeding each other, which would almost seem to produce each other in this succession," I cannot, from my own observation, confirm. Generally I have noticed them to occur singly, but occasionally there may be more

—J F S

The carbuncle "appears," says the same writer, "to have some affinity to the boil, but the boil differs in this respect, that it has more of the true inflammation, therefore spreads less, and is more peculiar to the young than the old, which may be the reason why it partakes more of the true inflammation." As to the causes of the disease, he observes—"As death is produced in a great deal of the cellular membrane, and, I believe, in it only, except the skin giving way, which I believe is by ulceration principally, it becomes a question whether this mortification arises from the nature of the inflammation, or rather from the matter being confined in the cells of the cellular membrane? I suspect the latter, for, I find that if this matter escapes from these cells, and comes into uninflamed cells, it produces mortification there" (pp 273, 4)

COPELAND (a) well observes—"Anthrax rarely occurs excepting in habits of body evincing more or less eaehevy, with sanguineous plethora, and disorder of the digestive funetions. For some days before its eruption, the patient complains of anorexia and increased disorder of these funetions, and of lassitude, chills, or shiverings. With the development of the tumour the febrile commotion increases, and presents the usual concomitants of inflammatory fever. If suppuration takes place, or if the ulceration is protracted, the attendant fever assumes gradually an adynamic character, and, in delicate, old, or very cachectic persons, it is nervous or adynamic from the commencement" (p 1055)

PERREZ (b) gives the following account of the physiology of carbuncle—"The malignant carbuncle of ontologique authors is a violent inflammation of the tegument and subcutaneous cellular tissue, produced from an irritation pre-existing in some organ, and most commonly in the organs of digestion, whence it is conveyed to the tissue where the carbuncle is developed. The irritation causing this inflammation is so active and severe that it is almost impossible to prevent the production of gangrene in a more or less large part of the tissue it attacks, but we may, by prompt and powerful antiphlogistic means, arrest the progress of this inflammation, and thus stop the gangrene and other consecutive symptoms. Whatever be the organ whence the irritation causing carbuncles springs, the violent pains, of which the inflamed part is the seat, may reproduce a more or less severe irritation, exasperate that which already exists, and produce in some organ, but most commonly in the stomach, a fresh irritation all of which may become dangerous if not physiologically contended with *** If an irritation be established in an important organ it produces the following effect on the carbuncle—the irritation which has caused the latter will be repelled by that of the recently affected organ, the carbuncle becomes pallid, the pains diminish, but the new irritation will increase, and with it the patient's danger. This must be put a stop to, and then the inflammation will reappear on the skin, or even, according as the remedies employed have diminished the disposition to irritation, the inflammation may not reappear. The carbuncle will be averted without the complete cure of the patient being retarded. In some rare instances, this same disposition to irritation will be so great, that the carbuncle and the secondary irritation which it has brought back, exasperated, or produced will co-exist with equal intensity. The gorging caused by the inflammation is sometimes so considerable, and so very rapid, that it cannot be stopped quickly enough, neither can the tissues stretch sufficiently to avert the strangulation of the gorged parts, and hence results gangrene" (pp 583, 6)]

119 *Benignant Carbuncle* frequently occurs without manifest cause, even in healthy persons, commonly in poor persons, who live in unhealthy neighbourhoods, eat bad food, and are very much reduced by preceding disease, also with impurities of the bowels. Carbuncle is in most cases the consequence of metastasis of deleterious matter (rheumatic

(a) Above quoted

(b) Observation d'Anthrax sur Charbon Vain, traité physiologique écrit et guéri, in Bruxell's Annales de la Médecine Physiologique, vol vii Paris, 1825

or gouty) It takes place at every age, in either sex, at every season of the year, but especially in the great heats of summer The *Malignant Carbuncle* is never connected with previous fever

[English surgeons generally do not hold with the metastatic origin of carbuncle, but believe it rather dependent on disturbance of the digestive organs, or on general disturbance or break-up of the constitution Thus, it is often noticed in women on the subsidence of menstruation, but more commonly in elderly men who have lived freely and worn their constitutions out RAYER says that carbuncle occurs most frequently in spring and summer, and our author that it happens especially in the great heats of summer I have not, however, observed it more common at one than another time of the year —J F S]

120 The danger of carbuncle depends on its size, seat, on the presence of many such swellings, on the constitution of the patient, and the general disease connected with it

[ASTLEY COOPER observes —“Carbuncle generally does well, except when situated on the head or neck Though persons recover from carbuncles of an enormous size upon the back, yet very small ones on the head or neck will often destroy indeed, I never saw a patient who recovered from any considerable carbuncle upon the head, in these cases there is effusion upon the brain, producing compression” (p 243) Carbuncle on the head is rare, I have not seen above two or three cases of it —J F S]

121 In the *Benignant Carbuncle*, the internal treatment is always guided by the difference of the fever and the causes of the carbuncle A strict antiphlogistic treatment is rarely indicated, but rather in most cases a mild sudorific treatment, emptying of the intestinal canal, and the employment of dilute mineral acids When the powers of the patient sink, which always happens on the occurrence of mortification, a more strengthening treatment is needed

122 The local treatment consists in making very early a cross cut of sufficient depth, by which the constriction of the cellular tissue is relieved The wound is to be bandaged with stimulating digestive salves, the sloughy cellular tissue to be removed, and an endeavour made to produce good suppuration If sloughs have formed, still the cuts must be made, or the previous openings enlarged, the sloughs removed, (which treatment is preferable to the use of the actual cautery, butyr of antimony and other caustics,) in order to make an escape for the gangrenous juice, collected beneath them, and to prevent its acting on the whole organism The further treatment is to be after the rules laid down for gangrene It is not true that merely softening poultices do harm, and favour the progress of the disease, and repeated experience has proved to me, that, after proper division of the carbuncle by a cross cut, the cure is effected most simply by the continued use of softening poultices

That cutting into the carbuncle is generally neither necessary nor useful (voy WALTHER) is the most dangerous statement which can be put forth in the treatment of carbuncle I have often satisfied myself that it was possible by an early cut to preserve the skin, the edges of which, after separation of the mortified cellular tissue, soon healed up, and it is possible only by a proper cut to form an outlet for the collecting gangrenous juice and the dead cellular tissue

[The practice of cutting deeply into carbuncles is of long standing in this country WISEMAN, (a) one of our early writers on Surgery, says —“I advise scarifying or cutting deep into it, (the carbuncle,) to give a breathing to the humour” And perhaps it may be, that to this practice must be attributed the cause of his very remarkable

able, and to us almost incredible statement —“I never saw a true carbuncle suppurate” (p 87)

BROMFIELD (a) recommends injections of bark and tincture of myrrh, but also “strongly inculcates the necessity, at a proper time, of making an opening sufficient to draw out the slough, for, in case you rely on that opening which is generally made by nature, the thin matter only will be discharged, and the sloughed or flocculent membranes will remain, and the orifice close up. When this is the case, how greatly detrimental at present, as well as troublesome in future, it may prove to the patient, every practitioner in Surgery can declare” (p 129)

The free incision of carbuncle, generally in a crucial form and deep, was also recommended, years since, by COOPER, ABERNETHY and most other English surgeons, JOHN PEARSON almost alone excepted, for the purpose of relieving the tension of the skin, and thereby diminishing the chance of its destruction, by the burrowing into the neighbourhood of the pent-up ill-conditioned pus, as well as that of the subjacent cellular tissue, so that, although DUPUYTREN has rather more pointedly stated, that “the treatment, like that of all inflammations with strangulation, consists in the methodical employment of incision which must go to the bottom of the carbuncle, and of which the ends must pass two or three times beyond its boundary,” (p 112,) yet our French friends have no right to claim either for him or for RAYER the origination of that practice

After the incisions have been made, stimulating poultices of either port wine, stale beer grounds, or yeast with linseed-meal, should be employed to hasten the separation of the slough, which effected, the large hole caused by its voidance must be treated with a common poultice, to encourage granulations, and, if these be sluggish, some gentle stimulant, as lint dipped in nitric acid wash or black wash, may be laid on the sore and covered with the poultice —J F S

PHYSICK (b), of Philadelphia, U S, recommends, as highly beneficial, the application of caustic vegetable alkali in quantity sufficient to completely destroy the skin when, in the second stage of the disease, the appearance of pimples and small orifices show that the process of making an opening through the skin to allow the dead parts and aerid fluids to pass out has commenced. “In all the cases in which he has used the caustic in this manner,” he observes, “the sufferings of the patient ceased as soon as the pain from the caustic subsided. It operates by destroying in a few minutes that portion of the skin covering the mortified parts which, if left to be removed by ulceration, would require several days for its completion, occasioning the chief part of the pain and danger attendant on and consequent to the disease” (p 175.) If it were necessary for the cure of the disease that the skin covering the dead cellular tissue should also die, then PHYSICK’s practice would be very satisfactory. But, as the object is to save the skin, which cannot, however, always be effected, though it ought always to be attempted, and in most cases is managed by making incisions through it early, and so relieving the tension which causes the sloughing of the skin, then PHYSICK’s treatment is decidedly improper

The use of blisters in carbuncle was also first proposed by PHYSICK, but he now doubts their value. He says —“From the great power of blisters in checking mortification, when proceeding from some kinds of inflammation, I once entertained high expectations of their utility in the treatment of anthrax. But, though I have found them serviceable in abating the burning pain attending the inflammation, they have not shown any power in counteracting its progress to mortification” (p 179.) COVTS (c) however, thinks “Still there is evidence enough to show that these remedies (*epispastees*) possess a high value in certain cases * * *. Although they may sometimes accelerate rather than retard the mortification of the centre of the tumour where they very seldom produce vesication, they appear to circumscribe the inflammation, and thus prevent the extension of the disease (p 30.) The commencement of the second stage,” he says, “is the most suitable time for the use of blisters, and the most fitting cases those where the extent and the situation of the swelling preclude the knife.” He also mentions a case in which almost immedi-

(a) Quoted at the head of the article

the Medical and Physical Science, vol ii

(b) Case of Carbuncle, with some Remarks on the use of Crustic in that disease, in CHAPMAN’s Philadelphia Journal of

Plulidelphi, 1821 8vo (c) HAY’s American Cyclopaedia of Practical Medicine and Surgery,—article Anthrax, vol ii Philadelphia, 1836 8vo

diately a blister caused a complete line of demarcation where the mortification of an anthrax of the worst kind was spreading rapidly. The swelling was situated on the first cervical vertebra and extended some inches on the scalp, very dangerous cerebral symptoms came on, but yielded readily to the blister (p 30)

PERREZ (*a*), who is a disciple of BROUSSAIS, does not consider incision of a carbuncle sufficient unless it produces free bleeding, and, if it do not, then leeches are indispensable, "the incision merely putting an end to the mechanical cause which adds to the existing irritation, and the latter continuing after, although much diminished by the separation of the slough, requires a persistence in the antiphlogistic remedies to lessen still further and to put it out completely. Marsh-mallow or linseed-meal poultices must be used, and if, from any cause, the inflammation be re-excited, local and general means must be had recourse to. In the case which PERREZ mentions as having treated on these principles, the advantage gained does not seem so great as he would wish to be inferred. On the first day thirty leeches and on the second fifteen leeches were applied, and the carbuncle covered up in boiled marsh-mallow poultices. The patient was strictly debarred from all solid or liquid food for three days, during which time she was, being of a nervo-sanguineous temperament, well drenched with a quantity of acidulated and gummy drinks. In the following days the sloughs separated, and, as usual, the pain almost entirely subsided. A short time after, the surface again inflamed, leeches were applied around, the wound did well, but, from the recital of the case, although not positively stated, probably not very quickly.

The older surgeons, and even POUTEAU, employed caustic, and even the actual cautery, but both practices are now completely exploded.

123 The *Malignant Carbuncle* requires, especially, the proper treatment of its accompanying fever, and the local application of stimulating poultices, even of the actual cautery, or other caustics, if the swelling will not proceed the other treatment agrees with that already described.

THIRD SECTION —OF INFLAMMATION IN CERTAIN SPECIAL ORGANS

I—OF INFLAMMATION OF THE TONSILS

LE CAT, C L, Memoire sur l'Exirption des Amygdales Squirrheuses, in the Journal de Médecine, vol ii p 115 1755

LOUIS, Sur la Resection des Amygdales Tuméfiees, in the Mem de l'Académie de Chirurgie, vol v p 423

DESAULT, Œuvres Chirurgicales, vol ii

PERRIN, N, DISS sur la Resection des Amygdales, Paris, an XIII 4to

LEHWEHS, DISS de Scirrho Tonsillarum Berol, 1817 8vo.

CHEVALIER, THOMAS, Description of an improved Method of tying Diseased Tonsils, in Med-Chir Trans, vol iii p 80

PHYSICK, PH SYNG, in Philadelphia Journal of the Medical and Physical Sciences, vol i 1820, November, p 17

LISFRANC, Considérations anatomiques, physiologiques et pathologiques, sur la Lutte, in Revue Médicale, July, 1823

CHOLLET, Des Moyens Chirurgicaux appliqués au Traitement de l'Amydalite Paris, 1827

124 *Quinsy*, or Inflammation of one or both Tonsils, (*Angina Tonsillaris*, Lat, *Kehlsucht*, Germ, *Esquenancie*, Fr,) when accompanied by much swelling, interferes with swallowing and breathing, the patients speak through the nose, and are much troubled by the phlegm which collects in the throat. Not unfrequently there is singing and pain in the ears, from closure of the Eustachian tubes. The swollen tonsils

(*a*) As above.

are felt beneath the jaw, and seen distinctly when the patient's mouth is opened and the tongue thrust down, and the swelling is often so great as to block up completely the passage of the throat. More or less active febrile symptoms are present, according to the degree of the inflammation.

125 This inflammation originates most commonly from cold in delicate persons unused to exposure to the air, also from any severe irritation of the throat, from spreading of the inflammation from other parts, from the venereal disease, from eruptions of the skin, and so on.

126 In most cases the inflammation of the tonsils is *resolved*, not unfrequently it runs into *suppuration*, less indeed as consequence of its own activity than of a peculiar disposition which inflammations of the throat in many persons have to pass into suppuration, more especially if former attacks of the kind have terminated in a similar manner. This may be looked for when the inflammation of the throat has existed for several days with uniform severity, when the sensation of pressure in the throat becomes greater and much mucus is collected therein. The passing into *hardening* is never observed in active, rapid inflammation of the throat, but when it creeps on slowly and recurs frequently, the consequence of which is, a *growth* (or hypertrophy) of the parenchyma of the tonsil gland rather than an actual hardening. The passage into *gangrene* is always dependent on a malignant character of the accompanying fever, and is extremely dangerous.

[Abscess in the tonsil having once occurred, is very commonly again and again produced whenever inflammation attacks the gland, and so quickly that any attempt to prevent its formation is useless, the inflammation rushing, as it were, headlong into suppuration. During its course the agony and inconvenience are very great, but, on the bursting or opening of the abscess, the symptoms as suddenly cease.

Dr TWEDDIE (*a*) says, that although enlargement of the tonsils results from repeated attacks of inflammation, "it is, however, in some instances congenital, and occasionally appears to be hereditary, and in such individuals it is often associated with traces of the strumous diathesis. The enlargement generally exists without induration of the tonsil, more especially when it occurs in young persons when it arises as a consequence of inflammation, and more particularly in elderly people, the enlargement is generally accompanied by induration" (p 185).

Gangrene of the tonsils is very rare, and in the two cases, both fatal, mentioned by GUERSFNT (*b*), it was only attendant on more important disease. In the first case the tonsils appeared to be attacked simply with severe inflammation, and were fortunately relieved by antiphlogistic treatment, but subsequently they became livid, produced a secretion resembling wine lees, and very offensive, and on the seventeenth day the patient died. On examination, besides softening and black or dark-grayish disorganization of the tonsils and soft palate, the same change was found in a portion of the right lung. In the second case, tonsils were at first but slightly inflamed, on the third or fourth day, however, they assumed a brownish colour, and a very offensive smell, and when cut into were not painful. The patient gradually sank with vomiting and severe gastro-enteritis, but unaccompanied with much febrile excitement. After death the mucous membrane of the stomach and part of the small intestines were bright red, and in the former covered with a white soft elastic tissue membrane (p 131).]

127 The treatment differs according to the activity of the inflammation and the accompanying fever. In slight inflammation mild diaphoretics are of service, as elder and lime-flower tea, solution of acetate of ammonia, hydrochlorate of ammonia, and so on, in the more active degree, bleeding, application of leeches, nitre in emulsion, calomel. For

(*a*) Diseases of the Throat, in Cyclopædia. (*b*) Dict de Médecine, vol II.—Article Angine Gangreneuse.

bathing the inflamed part soothmg decoctions are used in form of gargles or injections, which latter more readily clear away the mucus, and do not produce any straining of the parts The inhaling of warm soothmg vapours also serves the same purpose

[Dr WATSON (*a*) says the only gargle he considers "admissible in the commencement of the malady, is a gargle of warm milk and water * * * But far better than any thing else, as a local application to the inflamed fauces, is the steam of hot water, whether we are hoping for resolution of the inflammation, or whether we desire to promote and hasten the process of suppuration already begun * * * The most convenient and effectual inhaler is that of HERCY, from which a large volume of steam is carried inwards against the fauces by the mere natural breathings of the patient"] (p 790)

128 In great swelling of the tonsils *scarifications* are specially useful, these are made with the palate-lancet or with a common bistoury, the edge of which is guarded nearly to the point, or with the *pharyngotome*. The patient is to be placed so that the light may fall into his mouth, which is kept open by thrusting a piece of cork between the molar teeth, the tongue is pressed down with a spatula, and shallow cuts are made with the instrument just mentioned into the swollen tonsils The bleeding is to be promoted by soothing lukewarm gargles

[In scarifying the tonsils, there is danger of wounding the carotid artery, or some branch, which will continue bleeding and cause serious alarm WATSON mentions in his Lectures a case of fatal bleeding from wound of the internal carotid artery — "Only a very few years ago, in Ireland, it was struck by a surgeon while scarifying a gentleman's tonsil, and he died in three minutes" In another case, which occurred under WATSON's own care in 1838, in which the tonsil glands, during convalescence from scarlet fever, having become so enlarged as to impede breathing considerably, "the surgeon in attendance punctured the tonsils The next day a good deal of haemorrhage took place, and this recurred several times, to a considerable and even alarming amount When the clots that formed were wiped away with a sponge, the blood could be seen welling out in a little stream, with a pulsating motion, from a small incision in the left tonsil The haemorrhage was ultimately, after much trouble and anxiety, arrested by applying a pencil of lunar caustic freely within the bleeding orifice" (p 792)]

I believe, in such a case, the use of the actual cautery would be preferable to any other remedy, and should certainly employ it if opportunity occurred —J F S]

129 When the inflammation subsides, but the swelling still continues, astringent remedies, as the *liquor ammoniae acetatus*, hydrochlorate of ammonia, sage, vinegar, and so on, are to be added gradually to the gargles, by the proper employment of which the disposition of the parts to chronic inflammation is prevented

130 When an *abscess* forms in the tonsil, which can be distinguished by the above-noticed signs (*par* 126), by fluctuation on touching the tonsil with the finger, and often by the pus itself showing through, and it does not break of itself under the use of softening gargles, great danger of suffocation, or burrowing of the pus, is to be feared, and it must then be opened with a guarded bistouri, or the pharyngotome, used as in scarification of the tonsils Irritation of the throat, and straining by vomiting, often effect the bursting of the abscess After the pus has been discharged, soothing gargles with honey are to be frequently used, and commonly produce a speedy cure In rare cases the abscess penetrates externally beneath the jaw, and then must be treated as common abscess

[In reference to the spontaneous bursting of abscess in the tonsil, which generally occurs between the pillars of the fauces, ALLAN BURNS (*a*) observes —“But Dr BROWN has informed me that in two patients it burst through the *velum palati*. In both these cases, the sore formed very much resembled a venereal ulcer, and, without great care, in tracing the origin and progress of the disease, would have been mistaken for a venereal affection. I may also mention,’ he continues, “that where the chief prominence in abscess of the tonsil is seen, not between the pillars of the fauces, but on the fore part of the *velum*, it is not to be expected that the tumour will point as in external suppurations. On the contrary, the pus will continue long deep-seated, and, were the surgeon to delay, in the expectation that it would become more superficial, the patient, before this event took place, would be suffocated. So soon, therefore, as the difficulty of breathing renders it necessary, an opening is to be made in the abscess, and that even where the matter is still deep-seated, but fluctuation, generally obscure indeed, must be felt, before we presume to thrust an instrument into the tumour. If this point be not fully ascertained, a poly pus may be mistaken for an abscess of the tonsil.” (p 255)]

BURNS considers that the bursting of a tonsillar abscess is attended with much danger. He says —“Whenever the abscess bursts, the mouth and fauces are filled by a gush of matter, every obstruction to the free entrance of the air is suddenly removed, the patient fetches an involuntary and deep inspiration, air and matter rush together into the trachea, and death, from suffocation, is almost the immediate consequence.” And, in support of this statement, he mentions the case of a strong, active, young man who thus lost his life —“He had been complaining for a few days of a sore throat, for which he had consulted his surgeon, who had employed the usual remedies. The inflammation terminated in suppuration, the abscess enlarged, till, at length, the tumour occupied almost entirely the fauces, yet, ten minutes before his death, he was walking about the house, restless indeed, anxious, and gasping for breath. The bursting of the abscess and death followed each other so rapidly, that no measures could be taken to prevent the latter event. The cause of death was not conjectured in this instance. The body was examined, and the trachea found deluged with purulent matter. To prevent a similar accident, it would be advisable, where the tumour is large, and the difficulty of breathing great, to puncture the abscess as we would do a hydrocele. Were the matter evacuated through a canula, there would be no risk of its finding way into the windpipe, and, if the stilet were made to project only a little beyond the canula, the trocar may be as safely used as any other instrument” (pp 257, 8).

In most cases of tonsillar abscess, the effort of vomiting excited by emetics is generally sufficient to burst the walls and discharge the pus, but, if this treatment be ineffectual, and the patient’s breathing be much interfered with, it is better to open the abscess, for which ALLAN BURNS gives the following directions —“One who is familiar with the parts in connexion with the tonsil, will, in entering the knife into an abscess here, take care not to direct its point in the line of the angle of the jaw, for, he is well aware, that if he do this, he may injure a large artery. He will push the instrument into the front of the cyst and carry it directly backwards, as if he intended to cut off a segment of the tumour, if he follow this course, and transfir the abscess, the worst which can happen will be injury of the back part of the pharynx, a trivial accident when compared with the effects resulting from opening a large blood-vessel” (p 257).

I think, however, that a gum-fleam is the most convenient instrument, its edge should be rested against the enlarged gland, as near the mesial line of the body as possible, to penetrate the swelling and then moved vertically and gently up and down, the handle of the instrument being held like a pen, till the abscess is penetrated, which in general is done quickly, and immediately the pus appears the fleam should be withdrawn. It is recommended, very properly, that the incision or puncture should be made directly backwards or from without, inwards and backwards, to avoid puncturing the internal carotid artery which might be easily done if the knife or fleam were thrust outwards.

The student is always very properly exhorted to puncture tonsillar abscess with great caution for fear of wounding the carotid artery. But, although this operation

(*a*) Observations on the Surgical Anatomy of the Head and Neck. Edinburgh, 1811.
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must be often carelessly and clumsily enough performed, yet dangerous bleeding is not so frequent as might be expected, and I have only been able to collect the following authentic accounts —

PORTAL (a) mentions a case in which, in performing this operation with a pharyngotome, "a dexterous surgeon of Montpellier had the misfortune to open a large artery, and see the patient perish of so severe a haemorrhage that nothing could arrest it" (p 509) ALLAN BURNS also says — "In this country, (Scotland,) I have been informed that a surgeon, in opening a tonsillitic abscess, actually did plunge the knife into the carotid I need hardly add that he lost his patient before he could suppress the bleeding" (p 256) My late colleague TYRRELL was accustomed to mention, in his Surgical Lectures, a case to which he was fetched by a practitioner, who, having punctured an abscess in the tonsil gland, the wound was immediately followed by severe bleeding, and the patient was dead before he could reach the house SIR BENJAMIN BRODIE informs me that he is cognizant of two cases in which death from bleeding ensued after the puncture of tonsillar abscess

From the puncture of an immature tonsillar abscess, alarming haemorrhage may occur, without, however, destroying life, for the following instance of which I am indebted to my friend LAWRENCE —

CASE — "In a gentleman labouring under *cynanche tonsillaris*, a premature punction was made, with the expectation of evacuating matter A most profuse bleeding ensued, which stopped from the occurrence of fainting; and did not recur It, however, not only seriously alarmed the patient and those around him, but also the gentleman who made the puncture A long time elapsed before the patient recovered his strength"]

131 When inflammation of the throat passes into mortification, the fever especially must be treated according to its character The local treatment consists in removing the sloughs and foul ichor from the throat by injection of decoction of bark, of scordium with alum, camphorated vinegar, and so on Hydrochloric acid with honey applied with a pencil of charpie on the mortified part is of great use

132 The *hardening* of the tonsils which remains after inflammation, is of a good character, it is little painful, but is commonly subject to repeated inflammatory attacks, yet very seldom does it run into cancer It may be treated with gargles of hemlock, belladonna, hydrochlorate of ammonia, and so on, by rubbing of mercurial or iodine ointment externally upon the neck, by the internal use of hemlock and by derivation, by repeated scarifications, and the frequent use of leeches If inflammation should occur and run on to abscess, suppuration must be suitably promoted, and the opening of the abscess delayed till all hardness has subsided In hardening of the tonsils, frequent painting during the day with fresh juice of *chelidonium*, at first mixed with honey of roses, but subsequently pure, is very efficient

[ELSE (b), who, many years since, was Surgeon to St Thomas's Hospital, denied that this so-called scirrhus of the tonsils was true scirrhus, the tonsils, in his opinion, never being affected with scirrhosity And TWEDDIE (c) observes on this point — "It is more consistent with pathological anatomy to ascribe those cases of supposed scirrhus of the tonsils to hypertrophy and induration alone" (p 185)]

A very common attendant on enlargement of the tonsils is a disagreeable roughness of the voice, and deafness also is produced, either by blocking up the apertures of the Eustachian tubes, or by pressing against their cartilaginous part It has also been asserted within the last few years, that enlarged tonsils are the cause, or one of the causes, of stammering, in consequence of which they have been very freely broached by the practitioner who broached the opinion, but the success of his operations has been less than he would wish to allow (d)

(a) Cours d'Anatomie Medicale, vol v

(b) MS Lectures on Surgery

(c) Above quoted

(d) On the Cure of Stammering, by the removal of the Uvula and Tonsils, in the Lancet for 1840-41, vol ii p 587

Local treatment with astringent gargles, in these cases, is of little benefit, and painting the tonsils with nitrate of silver not much more efficacious, though it should be tried I believe that constitutional treatment, attending to the state of the bowels, and giving occasional doses of rhubarb with calomel, or mercury and chalk, and a grain or two of sulphate of quina, twice or thrice a-day, with good diet and fresh air, is by far the most efficacious proceeding, although, whatever may be done, the tonsils, once enlarged, will, under excitement, again and again enlarge, and be very troublesome — J F S

In connexion with the inflammatory affection of the tonsils, and its occasional results, it may be convenient here to notice the formation of *calculi* in these glands, of which ALLAN BURNS makes the first mention He says — “It is not to be inferred that every chronic enlargement of the tonsil depends on thickening and induration of the substance of the gland, it is sometimes produced by the formation of calculi These seldom in the amygdalæ acquire any considerable size, but their presence is productive of irritation and repeated attacks of cynanche, the inflammation generally proceeding to suppuration After each successive discharge of matter, a solid and circumscribed tumour remains in the situation of the tonsil, where, sometimes by a probe, the calculus may be detected” (p 261) He mentions three cases of this disease, all occurring in members of the same family In the first there was, during eighteen months, repeated abscess of the tonsil, which burst always externally, a regular and solid tumour was then noticed on the left side, which protruded the skin just below the angle of the jaw, and was followed by a severe attack of inflammation, which ended in suppuration, and bursting externally by eight small apertures, discharged matter during a full year She then applied to a surgeon, who, having probed the wounds, found a calculus in the gland, and attempted its removal by an external incision, but was deterred by the bleeding from completing the operation, and brought away only a small fragment “In the course of fourteen days the calculus dropped from the tonsil into the mouth,” and the patient did well In the other two cases the calculus also escaped from the tonsil into the mouth BURNS says that “these and, indeed, all tonsillitic concretions have been distinguished by a fetid stercoraceous odour Sometimes the concretion does not acquire the same degree of solidity as in the cases mentioned In some patients it forms in the cryptæ of the tonsil, enlarging them, and even projecting into the fauces Where it assumes that form, it can, by any blunt instrument, be turned out from the recesses of the tonsil in gritty masses of a dirty-white colour The formation of this gritty matter would seem to be connected with some deranged state of the intestinal canal It will be necessary to pick the foreign substance from the tonsil, and, to prevent its reproduction, the bowels must be restored to their natural action It is by no means an uncommon affection” (pp 263-5)]

133 If the swelling of the hardened tonsils be so great that breathing and swallowing become very difficult, their partial extirpation is necessary If the swelling be not very great, two or three transverse, but not very deep, incisions are sufficient to produce their diminution in the course of a few days The removal is best effected by a narrow, slightly curved, blunt-pointed or button-ended bistouri, or with a narrow, straight, button-ended scalpel The patient should be placed on a seat opposite the light, his head resting on the bosom of one assistant and a little inclined forwards, and his mouth kept open by a piece of cork placed between the hind molar teeth, whilst another assistant keeps down the tongue with a spatula The operator fixes a double hook or MUSLEX’s hook forceps, which are preferable, in the swollen tonsil, holds the forceps with one hand and manages the knife with the other, so as to divide as much as is necessary of the tonsil at one stroke from beneath upwards (The hook or forceps are to be used with the left, and the knife with the right hand, if the left tonsil is to be removed, but the contrary, if the right) If the tonsil still remain partially attached, it must be cut off by a second stroke of the knife or with COOPER’s scissors

In unsteady patients DESAULT's *kiotome* is often preferable, which, when the patient is seated as above, the mouth open, and the hook, fixed in the tonsil, is so introduced with its edge retracted, that the tonsil comes against the slit part of the sheath, and the projecting part is cut off by the protrusion of the knife. The introduction of the hook often produces severe tickling in the throat, suffocation, and so on, in order to avoid which the division may be made without previous introduction of the hook. If, on account of its size, the whole tonsil cannot be received into the curve of the *kiotome*, a part of it must be removed by two oblique cuts meeting at an angle, or cross cuts are to be made with the *kiotome*, first at the upper part, and next at the lower third of the tonsil, the isolated part is then to be taken into the curve of the instrument, and the two transverse connected by a third longitudinal incision. The deep cleft thus formed falls together in the course of five or six days (a) FAHNESTOCK's *tonsillitome* (b), with the alterations of VELPEAU and RICORD, is preferable to DESAULT's *kiotome*. This instrument closed, that is, with the annular blades covering each other, and with the piercer retracted, is placed over the tonsil, which, projecting through the opening, is to be thrust through with the piercer, the movable stem is then pushed forward upon the immovable one, and the latter, at the same time, drawn back, so that the tonsil is taken off by the rings, of which the inner margins have each a cutting edge. Tying the tonsils is not to be preferred to their removal by the knife, but their destruction by caustic is to be rejected. Only in not very great swelling of the tonsils, can their diminution be effected by the repeated application of lunar caustic sufficiently to produce a superficial slough.

The removal of the hardened tonsils has been performed from the earliest time by *cutting*, by *tearing out*, by *tying*, and by *destroying with caustic*. CELSUS advised taking hold of the tonsil with a hook and cutting off the hardened part with a knife. In this manner the operation has been performed with little variation. According to LOUIS, the cut should be made from below upwards, according to RICHTER, from above downwards, and the imperfectly divided piece is to be removed with scissors, according to MOSCATI, the cuts are to be made in various ways, by splitting the tonsil from above downwards and sideways, by introducing charpie, by removing it piece-meal, and by cauterizing the surface of the wound with nitrate of silver.

For holding the tonsil, a single or double hook is employed, CAQUET's hook (c), MUZEL's hook forceps (d), WASSERFUHR's forceps with thick blunt hooks, so that it may be more easily removed in case of vomiting. For the cutting, a narrow, button-ended, curved or straight scalpel, special knives of PAULUS AEGINETA, of CAQUET, of BEN BELL, of BOYER, DESAULT's *kiotome*, the scissors of SOLINGEN, PERCY, LEVRET, the instrument of RIVIERI (e) and of J CLOQUET (f), with two branches, which cross, and each of which has an edge at its extremity.

Tearing out the tonsils was performed by CELSUS with the fingers, by FABRICIUS AB AQUAPENDENTE with the hook or forceps.

Tying the tonsils, mentioned so early as by GUILLEMEAU (g), was performed by SHARP (h) with silver wire or catgut, by CHESFOLDEN (i) the loop was applied with the finger and fastened with an eyed probe, swellings with a broader base were tied on the side with a double thread introduced by a needle having an eye near the

(a) ITARD, *Traité des Maladies de l'Oreille et de l'Audition*, Paris, 1821, vol II p 174

(e) *Comment Bonon*, vol VII 1791

(b) FRONIER's *Chirurgie Kupfersateln*, pl 447

(f) *Archives Générales de Médecine*, May, 1833, p 124

(c) *Mémoires de l'Academie de Chirurgie*, vol I pl XII fig 1

(g) *Chirurgie*, ch VI

(d) *Ib*, fig 3

(h) *Critical Inquiry*, sec VII ch VI

(i) SHARP's *Treatise on Operations*, plate

VII A B C

point, by BIBRACH (*a*) with a silver wire by means of LEVRET's double cylinder, by SIEBOLD (*b*) with a loop pushed on upon a pair of forceps, the ligature having been slipped on to them by an assistant, BELL introduced through the nose a loop which by means of the finger was carried over the tonsil and tied with a polypus-cylinder introduced through the nose, by CHEVALIER (*c*), a double thread was drawn through the base of the tonsil, after CHESELDEN's method, and tied with a ring-shaped knot closer HARD also invented a tying instrument (*d*) for the same purpose

Cauterization of the tonsil with red hot iron or with caustic, after the manner of SEVERINUS and WIESEMAN

[ELSE objected to the excision of the tonsils, especially in children, on account of the troublesome and dangerous hemorrhage, neither was he favourable to tearing them away with the forceps, nor to destroying them with caustic, but preferred CHESELDEN's apparatus, consisting of a tonsil probe, needle, iron, and *speculum oris*, or a piece of cork. If the base of the swelling be narrow, a thread can be readily carried round with the probe, but if it be broad, it will be requisite to thrust the needle, armed with a double thread, one white and the other black to prevent confusion, through the base from without inwards, and, when the eye of the needle appears behind the tonsil, the threads are to be taken hold of, the needle withdrawn, and the corresponding threads tied]

The instrument for amputating the tonsils, invented by PHYSICK of Philadelphia (*e*), consists of an oval iron loop, of two plates rather larger than the ordinary size of the tonsils, and attached to a long stem, upon which rests a sliding rod, terminating in a knife of hexagonal form. The tonsil is received within the ring, and the knife being then thrust forward, cuts it off as it traverses the loop. He also uses a pair of forceps, with lunate extremities, and their opposing faces toothed, to draw the tonsil more firmly through the loop. I do not know whether this is PHYSICK's guillotine instrument, which has been further improved by MITCHELL, as I have not seen either. Within the last eighteen months, SIMPSON, instrument maker, of Westminster, has adapted THORBERN'S staphylotome (which he has much simplified) to amputation of the tonsil, by giving the sliding knife an oblique cutting edge, like the guillotine knife, and the tonsil, being drawn through the aperture with a double hook, is readily cut off. Each side of the throat requires its own instrument, on account of the obliquity of the knife-edge.

In the United States some surgeons prefer scissors to the knife, and others the guillotine instrument of PHYSICK, with or without modification. The best scissors are those of Dr SMITH of Baltimore, the blades of which are curved on the flat, and bent like a hawk-bill towards each other, so that the points cross when the instrument is shut. Two small steel points are, in addition, attached to the side of each blade, so as to catch the portion excised, and prevent its falling into the glottis (*f*).

GIBSON of Philadelphia (*g*), with the view of getting rid of the numerous instruments formerly used for the removal of enlarged tonsil, has invented an instrument which at once keeps down the tongue, holds the gland firmly, and separates it nearly at the same moment. "It consists of a pair of forceps nine inches long, the eighth of an inch thick, half an inch broad when shut, with extremities an inch and a-half long, slightly serrated and somewhat curved, including, when closed, an oval space a quarter of an inch wide, and terminating, at the other extremity, in handles which stand off obliquely from the shafts of the instrument. A knife or blade, the length and breadth of the forceps, rounded on its cutting edge, and having a button placed perpendicularly to its axis on the opposite extremity, works backwards and forwards, by means of a groove, to the extent of an inch and upwards, between the blades of the forceps, to one of which it is secured by screws. A sheath upon each end of the forceps, to keep the knife from starting off the moment it touches the tumour, completes the instrument" (p. 27). "It is to be passed into the mouth with the blades closed, and resting flat on the tongue, which it presses. The instrument is turned edgewise, still resting on the tongue, its blades expanded, placed fairly

(*a*) Mémoires de l'Acad de Chir vol 1 p 480

(*e*) American Jour of Medical Sciences, 1827 8, vol 1 p 262-

(*b*) Chirurg Tagebuch, p 163

(*f*) See PAFCOAST'S Treatise of Operative

(*c*) As above

Surgery

(*d*) FRORIER'S Chirurg Kupfersatz

(*g*) Institutes and Practice of Surgery, vol 11

around and completely behind the tumour, which is then seized and firmly held, while the thumb, resting on the button-like extremity of the knife, pushes it forwards, and instantly separates the enlarged tonsil, which is immediately brought away in the grasp of the forceps" (p 27)

The ordinary practice now is to remove the tonsil by cutting through with a knife, of which the blade is guarded to within an inch of its tip, the gland being drawn inwards towards the mesial line with a tenaculum or double hook. There is soreness for a few days, but granulations soon form, and the wounded part heals — [J F S.]

134 The bleeding after this operation is usually stopped by frequent gaigling with cold water and vinegar, or charpie dipped in some astringent wash is applied with dressing-forceps to the bleeding part. In cases of necessity the red hot iron must be applied. During the inflammatory and suppurative periods, soothing and subsequently astringent gargles, with borax and so on, should be applied to the cut surface. If the suppurating surface assumes a luxuriant appearance, stronger astringents, even lunar caustic and the hot iron, must be used.

[Of wound of the carotid artery in removing the tonsil gland, I have not met with, nor heard of, a single instance]

LAWRENCE writes — "I have removed enlarged tonsils very frequently, the loss of blood, in the majority of cases, not exceeding a tea-spoonful. It would, I believe, always be so, if the parts are in a perfectly quiet state. I once performed the excision in a gentleman from the country, who was obliged to leave London immediately, where there was a state of active congestion in the fauees, the bleeding was considerable, but not alarming."

But their removal is sometimes attended with very fearful hemorrhage. My friend CALLAWAY informs me, that he has "seen sometimes considerable, and, in one case where he had removed the tonsil by the knife, alarming hemorrhage in a boy of seven years of age, which required stimuli, &c, to recover him from the fainting which followed" I have to thank my friend SHAW for the following

CASE — A man aged forty years was deaf in the left ear, and the tonsil on that side being enlarged, it was excised with the guillotine on Saturday. No bleeding of consequence followed, the gland being hard and light-coloured, as if of old standing. On Monday he complained of sore throat, and the incised surface appeared as if a superficial slough were about to form. On the afternoon of Tuesday bleeding commenced in the lower part of the cut surface where ulceration had taken place adjoining the slough. An oozing of blood, varying in quantity, continued, in spite of repeated attempts to check it with styptics, till the afternoon of Thursday, when he was so much exhausted that the carotid artery was tied. The bleeding now ceased completely, the wound rapidly closed, and the ligature came away on the twelfth day, in a short time after which he was discharged cured.

This ease seems to bear a close resemblance to that of LAWRENCE's, and both may, perhaps, be explained, on the presumption that the small vessels of the enlarged tonsil gland were unable either to contract or retract, in consequence of the adhesive matter with which the cellular tissue of the gland was filled, and by which its enlargement was caused, preventing their closure — [J F S.]

135 The *Uvula* is frequently so relaxed and lengthened by long-continued and repeated inflammation, that great inclination to cough and vomit, and difficulty in swallowing, is produced. In less degrees of swelling strongly astringent gargles of decoction of oak bark with alum, tincture of catechu, touching with acid, stimulating substances, with lunar caustic (1) and so on, are serviceable. In greater swelling, if these means fail, the removal of the *uvula* is called for. The patient being placed in the same position as for the removal of the tonsils, the *uvula* is to be taken hold of with a pointed hook, and the superfluous part cut off with scissors or with the kiotome. The after-treatment is similar to that for removal of the tonsils.

(1) BENNATI (*a*) recommends cauterization with nitrate of silver by means of a double caustic-holder

The simple operation of removing the uvula was performed before the time of HIPPOCRATES by cutting, and in this way it has been mentioned by CELSUS, GALEN, ORIBASIUS, AETIUS, and PAULUS AEGINETA, by means of the already mentioned various instruments used for removal of the tonsils, to which must be added the *staphylagra* of PAULUS AEGINETA, to hold, and the *staphylotome* to cut with, THORBERN'S (of Norway) instrument (*b*), with the alterations by RAU, (*c*), by BASS (*d*), by FRITZE (*e*). The cauterization first mentioned by DEMOSTHENES of Massilia was performed by PAULUS AEGINETA with the aid of a *staphylocauston*, and, by the Arabians, partly by caustic and partly by red hot iron, PARI used the ligature and the two FABRICII employed, by turns, scissors, caustic and ligature

[Relaxation and elongation of the uvula is a most troublesome complaint ASTLEY COOPER, who never removed more of the uvula than would reduce it to its proper proportions, as, if the whole were cut-off, fluids could not be taken without their passing into the nostrils, and without interference with articulation being produced, did not, however, consider any benefit was derivable from the operation, as the uvula almost invariably again acquired its natural length Neither can I advise it, because from personal experience I know it to be unnecessary It is commonly sympathetic with irritation of the alimentary canal, and when that is quieted, the uvula resumes its ordinary length It often becomes very red, lengthens and swells in the course of an hour, and, by its constantly dropping on the epiglottis, irritates it, and excites a constant hacking cough, and frequently a sense of choking, the best immediate remedy for which is closing the mouth, and breathing through the nostrils I have tried all sorts of astringent gargles, but found little relief from them, and have only been benefited by painting with a strong solution of nitrate of silver twice or thrice a-day, according to the irritation produced —J F S]

II.—OF INFLAMMATION OF THE PAROTID GLAND

LAGHI, T, Historia Epidemicæ constitutio[n]is, in quâ Parotides seroso glutine tumentes redduntur, quæ anno 1753 Bononiæ contigit, in Comment' Bonon, vol v p 1

HAMILTON, R, Account of a Distemper, by the common people in England vulgarly called the *Mumps*, in Trans of Roy Soc of Edinburgh, vol ii p 59 1790

HOPFF, Diss de Anginæ Parotideæ Goetting, 1799

BRENNELCKE, Diss Anginæ Parotideæ Descriptio pathologico-therapeutica Helmst, 1804

BURNS, ALLAN, Observations on the Surgical Anatomy of the Head and Neck Edinburgh, 1811 8vo

GOOD, MASON, M D, Study of Medicine London Second Edition, 1825, Vol II

136 *Inflammation of the Parotid Gland* (*Inflammatio parotidis*) has a different course, according as it is connected with catarrhal fever, or is a *symptomatic, critical, or idiopathic disease*

137 The *Mumps*, in Scotland the *Banks*, (*Angina seu Cynanche parotideæ*, Lat, *Bauerwetzel*, Germ, *Oreillons, ou Ourles*, Fr,) consists in a sometimes cold and rather oedematous, at other times hot, tense, painful, flat, or raised swelling of the parotid and submaxillary glands, with which also the tonsils are sometimes swollen, and swallowing and opening of the mouth prevented The skin generally preserves its natural colour, or has an inflammatory blush The swelling is frequently

(a) Bulletin des Sciences Médicales, 1831, Août, p 215

(b) THOS BARTHOLIN, Obs Anatom, cent ii obs 88 SCULTETUS Armament, pl ix fig 1

(c) HEISTER, pl xxi fig. 8 (d) NUCK, p 141 (e) Med Annal, vol i Leipzig, 1781

unaccompanied with fever, soon disperses, and does not easily run into suppuration, catarrhal symptoms, chillness, rigors, and depression commonly precede, and it is mostly connected with fever similar to catarrhal, and frequently with active fever. In these cases a metastasis of the fever easily occurs. As the swelling of the parotid gland subsides, a fresh attack of fever with severe shivering, with pain in the loins and pubes, takes place, followed by inflammatory swelling of the testicle, and, in women, of the labia and breasts. Itching and burning in the generative organs, and, frequently untimely menstruation, follow. The swelling of the parotid gland often still continues, but sometimes the inflammation, though it may have subsided, returns to the gland. Other parts are also frequently attacked, drowsiness, severe headache, wanderings, inflammatory or spasmodic affections of the breast, active vomiting, dropsical swelling of the whole body with short breathing and high fever occur.

In trifling cases the inflammation often subsides in a few days, sometimes later, with perspiration spreading over the whole tumour or over the whole surface of the body, with critical flow of urine and bleeding from the nose. The passage of this inflammation into suppuration or hardening is very rare. In some cases wasting of the testicle has been observed.

[DR MASON GOOD (*a*) speaks of two kinds of inflammation of the parotid gland, the one just mentioned, and another, which he calls *Parotid Phlegmon*, but both exhibiting two species or varieties, a simple or benignant, and a malignant form.

The first kind, his parotid phlegmon, Good briefly characterizes as "a tumour situated under the ear, reddish, hard, pain obtuse, suppuration slow and difficult," (p 326,) and is "troublesome, and sometimes fatal" (p 408.) Of its *benignant* variety he says — "Though the suppurative process is slow and inactive, the incarnation subsequent upon the breaking of the abscess is regular and unobstructed." He mentions a case of this kind, in which a girl of fifteen years had, after the duration of the disease for ten weeks, "for about a fortnight an evident pointing towards the surface, and a feel of irregular fluctuation, it afterwards broke, a large quantity of good pus drained away daily, and the tumour, which at first was extensive and hard, by degrees very considerably diminished, and clustered or divided into lobes, and at length disappeared altogether" * * * "The abscess in some cases of this variety, is of considerable magnitude, and consequently the discharge of pus very large." He says, that, sometimes, "the pus has been absorbed, and carried off by metastasis to some remote organ," of which he cites examples (pp 327, 8.) The *malignant* variety, Good says, "seldom appears in early life, and, in females, seems sometimes to follow upon the cessation of the catamenia. It is still slower in its progress than the preceding, and, when at length it breaks, the pus is imperfect, and cheesy or serous. It is also profuse, and protracted to a long period, and accompanied with fatal sloughs. The patient is debilitated by the discharge, the irritation excites hectic fever, and the case frequently terminates fatally" (p 328.)

The second kind, or *Mumps*, of which CHELIUS has just treated, Good observes, "is altogether of a different kind" from his first kind, "is more extensive, more painful, and rarely tends to suppuration." This kind, he proceeds to say, "in advanced life, is sometimes apt to run into a chronic form, accompanied with very mischievous symptoms, in which state it is denominated a malignant parotid. This is more especially apt to take place in females, when menstruation is on the point of ceasing, and the general action of the system labours under some disturbance" (p 409.)

138 This disease prevails mostly as an epidemic, more frequently in southern than in northern regions, in very changeable, especially moist

(a) Above quoted

and wet weather, and in spring time. Some consider it contagious, it, however, attacks only once during life, it seizes on all ages and both sexes, young people especially, and particularly young males. The severity of this disease differs materially in different epidemics.

139 Inflammation of the parotid glands not unfrequently occurs in typhus fever, sometimes with, sometimes without, benefit. Scrofula, syphilis, repulsive eruptions, often giving origin to it, or it is caused by improper use of mercury, caustic teeth, difficult dentition, by cold, or by external injury. The character and course of the inflammation differs in these cases. It may be so severe as to run into mortification, but generally has a milder result, and passes into suppuration (1), hardening (2), and *sai comatus* hardening of the parotid.

[(1) EVANSON and MAUNSELL (a) say, that the swelling of mumps "at times, but very rarely, will proceed to suppuration, and may cause immediate death, by discharging its contents into the larynx, if it burst internally, or lead to great deformity when it opens externally" (p 216)]

(2) MASON Goon says, his parotid phlegmon "assumes, occasionally, a scirrhouss hardness, and grows to a considerable extent, it has been extirpated, but with variable success, when upwards of three pounds in weight (b), sometimes with a cure (c), but, at other times, it has degenerated into a foul bleeding and extensive ulcer" (d) (p 328)

140 If the inflammation be mild, the preservation of warmth in the swelling by covering it with flannel, or bags of elder flower and so on, and the use of gentle diaphoretics, are sufficient. If the condition be decidedly inflammatory and the fever severe, antiphlogistic means, and even blood-letting must be employed, moderately, however, and with great caution. But, if the patient be very weakly, and the fever incline rather to the nervous type, mild infusions of balm, valerian, with solution of acetate of ammonia, camphor, and so on, must be given. When the swelling has not properly risen, when it has subsided, or when the perspiration upon it ceases, a blister may be applied. When the inflammation attacks the generative organs they must be kept warm, covered with flannel, and the testicles supported by a suspensory bandage. If the brain be attacked, blisters must be laid upon the scrotum and on the parotid glands and *liquor ammon acet* with warm drinks administered internally, and, in depressed vital powers, camphor, antimonial wine and the like. The vomiting originating in nervous irritation must be treated by suitable remedies both external and internal. If the swelling continue long and do not disperse, a volatile liniment with camphor is to be rubbed in.

141 If the inflammation of the parotid gland be connected with dyscratic state of the body, a corresponding general treatment must be had recourse to, according to the variety of the symptoms, leeches, mercurial friction, dispelling plasters, herb bags, and derivative remedies are to be used locally.

If the inflammation be critical, every thing must be withheld which may produce its revulsion. If the swelling be accompanied with a propei degree of inflammation, it must be simply covered with a mild

(a) Above quoted

(b) KALTSCHEID, Pr de Tumore Scirrhoso trium cum quadrante librarum Glandulae Parotidis extirpato Jenae, 1752

(c) SIEBOLD, Parotidis scirrhose feliciter extirpatae Historia Erf, 1791

(d) Commerc Lit Nor, 733-8

poultice, if the living activity in it be too low, stimulating poultices and plasters must be applied

142 When suppuration has taken place the abscess either breaks of itself under the use of the remedies mentioned in the treatment of abscesses, in which case the cure commonly soon follows or the formation of abscesses is accompanied with severe symptoms, delirium, lock-jaw, and so on, under which circumstances the swelling is to be soon and sufficiently opened, so that the tension of the aponeurotic sheath of the gland may be relieved According to its condition, the abscess must be treated with soothing or stimulating remedies The treatment is always tedious, knotty scars and detached hardnesses readily form If a fistulous aperture remain, through which the spittle flows, it must be treated by touching with lunar caustic, which, aided by proper compression, will close it (a) If the gland become hard, it must be treated after the ordinary rules

III —OF INFLAMMATION OF THE BREAST

SCHLEGEL, F. A , De Statu sano et morbo Mammarum in Gravidis et Puerperis Jenæ, 1792

MÜLLER, fragmentarische Bemerkungen über die Entzündung und Heilung der Entzündung und Vereiterung der Bruste bei saugenden Weibern, in VON SIEBOLD's Chiron, vol II p 2, par 344

BOER's naturliche Geburtshülfe und Behandlung der Schwangern, Wöchnerinnen und neugebornen Kinder, Wien, 1817, vol III p 23

BENEDICT, T. W , Bemerkungen über die Krankheiten der Brust and Achseldrusen Breslau, 1825 4to I IV

COOPER, A P , Illustrations of Diseases of the Breast London, 1829 4to

JEANSELME, G , Memoire sur les Inflammations et les Abces du Sein chez la Femme, in Gazette Médicale January, 1839

143 *Inflammation of the Breast (Inflammatio Mammarum)* occurs in women either nursing or after that period, and is situated either in the skin and cellular tissue alone, or in the parenchyma of the gland itself

144 If the inflammation occur during suckling, the breast on a sudden becomes tense, red, and swollen If the inflammation be superficial, a regular smooth and shining swelling may be felt, but the secretion of milk does not always cease In inflammation of the parenchyma of the gland the swelling is harder, different knobby swellings are felt, and the secretion of milk is completely stopped It is not unfrequently accompanied with febrile symptoms

145 The superficial inflammation of the breast generally subsides of itself, but, if the parenchyma be attacked, the inflammation at a certain stage proceeds to suppuration, and not unfrequently hardening remains

146 The usual causes of this inflammation are cold, mental excitement, mechanical injury and so on Women who do not suckle, or who wean their children early, are specially subject to inflammation of the breast In order to prevent it, they must use a strict diet, encourage perspiration, take purgatives, apply cotton fumigated with sugar to the breasts, rub the nipples often with spittle, and support the breasts

[Too many women, to their great shame, refuse suckling their children, on account of the restraint which this, one of their most important duties, puts upon

(a) For the further consideration of the treatment of fistulous opening in the parotid duct, see Salivary Fistula, par 902

them, some, unfortunately, early lose the progeny they would sacrifice themselves to bring up, and others, either from ill-health or from soreness of the nipples, are incapable of giving suck. In all these cases the secretion of milk must be checked, and the milk already secreted induced to absorb. Spare diet and purging, as recommended by CHELIUS, will usually effect the first object. As to the second, an evaporating lotion of spirit of wine or Cologne water, kept constantly on the breasts, which are to be carefully supported, and, therefore, the recumbent position and undress are the best for the purpose. The ordinary practice of monthly nurses is continued, and gentle friction of the breasts with oil and brandy performed three or four times a-day.—J F S.]

147 The same remedies must also be employed at the commencement of inflammation. And not until it becomes more active, and the swelling tense and hard, must warm softening poultices and soothing steam be applied to the breast, and emollient ointment rubbed in. If the inflammation disperse, the tension and swelling gradually subside, isolated hardenings slowly disappear under the use of softening poultices and mercurial salve. If the inflammation take place whilst the child is still sucking, it may be freely put to the breast, so long as the swelling and pain are not great. If with a free flow of milk the child cannot draw off sufficient, it must be withdrawn by a milk-glass in the intervals. If the inflammation becomes very severe, all attempts to remove the milk from the breast are injurious.

148 If the inflammation pass into suppuration, the softening poultices must be continued, cicuta or mercurial plaster applied, and the opening of the abscess left to nature. In general many openings take place at different parts, and they are to be treated in the usual way till they close.

If during suppuration fistulous openings are formed and the breast remain very hard, (which is commonly the case when the abscess is opened artificially, or lumps of charpie are introduced into the openings,) the before-mentioned mode of treatment can alone effect the resolution of the hardening and the closure of the openings.

After much experience, I cannot but reject the opening of abscesses of the breast recommended by many. There are, however, exceptions, when the abscess is very deep, when it has proceeded slowly, when the local pain is very great and the fever high, and profuse perspiration and continued restlessness are present. After the artificial opening, poultices must be always applied as above mentioned. In lengthy fistulous passages in the breast gland, LANGENBECK recommends the introduction of ligatures. I have, in such cases, even when the fistulous passages have been accompanied with much surrounding hardness, always attained my purpose with the treatment above stated. If milk escape from these passages, its secretion must be lessened by the use of purgative remedies, together with a sparing diet, or, in weakly constitutions, by the use of bark and strengthening food. Nothing is more objectionable than the introduction of tents into fistulous passages of the breast gland, or, as has been very recently advised, the putting in little tubes to keep up the flow of pus. The irritation is always thereby much increased and hardening of the whole neighbourhood originated.

[CHELIUS's recommendation of leaving "the opening of the abscess to nature" must on no account be followed, as its certain result is, according to his own observation, the occurrence of "many openings at different parts" of the breast, and the necessary production of very unsightly scars, which most grievously annoy the patient and her friends, and deservedly discredit the reputation of the medical attendant. The abscess is *always to be punctured freely, so soon as fluctuation can be distinctly felt*, and whilst the walls of the abscess are still thick. The almost immediate ease gained by relieving the tension of the fibrous covering of the breast gland is the first advantage obtained, the burrowing of pus is also prevented, and thereby a smaller cavity left, when emptied, to fall together and fill up by granulation, and,

most important of all, the sloughing of the skin almost to a certainty precluded No squeezing or kneading of the breast to evacuate the pus, as often most improperly practised, is to be on any account resorted to, the agony thereby produced is extreme, the benefit gained nothing, for the aperture made should be sufficiently large to permit the free escape of the matter, which, having been allowed to flow as long as it will, a strip of lint, oiled, is to be introduced between the lips of the wound to prevent their union, and a light bread poultice, or warm fomenting flannels laid over the breast and repeatedly renewed. In the course of a few hours the lint should be withdrawn, and the wound generally remains sufficiently open to permit the continual flow of the pus. If, as not unfrequently happens, clots of adhesive matter, or dead cellular tissue, block up the opening so that the matter does not readily escape, they may be gently removed if they protrude between the lips of the wound. But, if not, and the pus be still retained, a grooved director should be very gently introduced into the cavity of the abscess, and by its canal the discharge will pass, but no pressure is on any account to be used. If a second, or even a third, abscess point, or if the same abscess point at a different part of the breast, these are severally to be opened as they occur, the prime object of the treatment being to remove every chance of sloughing and scar of the skin. Oftentimes the first discharge is extremely fetid, more particularly if the opening of the abscess have been delayed, or if it have been left to burst spontaneously, and in these cases the constitutional excitement is frequently very great, amounting even to delirium. The character of the suppuration, however, usually soon becomes healthy, and the febrile symptoms speedily subside. CHELIUS's objections to passing tents or tubes into the fistulous passages, which generally alone occur from leaving the abscess to burst of itself, are well founded, they never ought to be employed. Neither should LANGENBECK's plan of introducing ligatures be for a moment thought of, it is very bad practice.

Fistulous passages almost invariably occur from the pus not having a convenient and complete discharge. Sometimes gentle, well-applied pressure along the course of the sinuous passage may be sufficient to produce inflammation and adhesion of its walls, but, if not, or if the patient cannot, as sometimes happens, bear the necessary pressure, then a probe should be introduced, and its extremity cut down upon through the skin at that part of the sinus which is most depending. Usually in a few days the old aperture heals, the pus is discharged by the new wound, and soon a cure is effected. As a general rule, injections of these adventitious canals is not advisable, but, when the opening is at the most depending part, and they can be employed simply to wash out the canal and slightly irritate it, but without being retained, which will often create more inconvenience than that to be got rid of, then they may be used with discretion. A mild solution of sulphate of zinc is, I believe, the best injection.—J F S J.

149 After previous inflammation there frequently remain the so-called Milk-knots, (*Milchknöten*, Germ., *Ganglions laiteux*, Fr.,) or they appear at a shorter or longer period after the suppression of the secretion of the milk, or after weaning the child, in cases where the secretion of milk seemed to have entirely ceased. Their hardness varies, and is often cartilaginous, though only containing milk, they may remain for a long while, and on superficial examination are easily mistaken for scirrhous. Their termination is in *resolution*, which is still possible after a long while, or in *suppuration* if they accidentally inflame. The remedies which effect their dispersion are, gentle rubbing of the breast towards the nipple, sucking the nipple, softening poultices, especially oatmeal, linseed meal, cicutae, hyoscyamus, saffron and oil, rubbing in lard and hartshorn. Some recommend belladonna internally. The dispersion is always accompanied with a flow of milk from the breast. Milk-knots which have not yielded to any remedies often subside at the next lying-in.

150 Inflammation of the breast, apart from suckling-time, has generally an insidious course. The pain in the neighbourhood is very slight,

but the swelling of the breast is always very hard, and the inflammation has a marked disposition to hardening. Its causes are external injury, dyscracy, scrofula, gout, syphilis, and so on. In many cases the inflammation sets in without any manifest cause, and the ground of the irritation may be merely the sympathetic relation of the breast to the womb, which discoveis itself especially at the period of decrepitude, and in unfruitful women, in whom the functions of the womb have never gone on regulaily.

151 The treatment of such inflammation must be guided by the previous mischief. Repeated application of leeches, infliction of mercurial ointment, warm covering of the breast, and internal remedies suited to the general dyscracy, are here required, although they can rarely prevent the production of hardening. When this takes place, it must be treated after the general rules.

152 In rare cases, either during suckling or not, deep-seated abscesses form in the breast gland or between it and the pectoral muscles, the formation of which is connected with a deep-seated pain, at first shifting, burning, tearing, with a considerable colourless swelling of the whole breast, and pain on moving the arm, and it continues for a long time before any external fluctuation can be perceived. The pus frequently makes its way out at several points, and the breast gland is hard and swollen. If these suppurating passages be opened, they present a soft reddish fungus. When fluctuation in such abscesses can be ascertained, they must be opened early. If fistulous passages have formed, they must be laid open throughout their whole length, or, in order to prevent deformity of the breast, and interference with its function, (according to LANGENBECK, the ligature should be introduced,) softening poultices and rubbing with mercurial ointment should be employed. If a part of the breast be so distended by these passages that, after opening them, it seems to hang as it were by a neck, it should be entirely removed, the cure soon follows. The passage to suppuration may perhaps be prevented by the early employment of diaphoretics, by emetics, by dry warmth, and by the application of derivative blisters in the very neighbourhood of the breast.

HEY, WILLIAM, *Surgical Observations*

RICHTER's, *Medizinische und chirurgische Bemerkungen*, vol 1 p 50

LANGENBECK, *Nosologie und Therapie der chirurgischen Krankheiten*, vol 11 p 261

[In the description which ASTLEY COOPER gives of chronic abscess of the breast, it will be seen that he had noticed the severe pain to which CHELIUS alludes. "Under chronic inflammation," says COOPER, "an abscess is sometimes produced, which, from the length of time it is forming, from the little pain which attends it, from the absence of redness and heat in the part, and from the want of rigors and other constitutional symptoms, prevents the suspicion of the formation of matter, and the swelling is supposed to be a malignant tumour, which requires an operation for its removal." (p 14.)]

I had once the ill luck of operating on such a case, of which the following is the account, and will be found to tally so nearly with the ordinary history and course of scirrhus that I may be held excused.

CASE—E S, aged forty-five years, a married woman, admitted

July 23, 1835 About twelve months since received a blow on the right breast, and four months after, whilst suckling, received another, but she felt nothing more than a slight shooting, of which she took no heed till after weaning her child, four months

since She had not suckled from this breast, as the last child would not take it, but the secretion continued, and the milk flowed out till she ceased to suckle After weaning, the breast began to swell, and she first noticed the lump, for which she applied leeches and fomentations These diminished the general swelling, but without dispersing the lump, which, on the contrary, continued increasing, accompanied with smarting pain, and at the time of her admission was about the size of a pigeon's egg, situated just below and to the outer side of the nipple, with the skin slightly adherent, very hard, and the nipple somewhat retracted.

July 31 The tumour was removed, and, on cutting into, was found to contain the cyst of an abscess about the size of a walnut, and containing pus The surrounding parts were thick and hardened, but there was not any appearance of scirrus She did well —J F S]

153 Imperfections of the nipples, if they be too small, inflame, or are overspread with a pustular eruption, render sucking painful or impossible, and frequently give rise to inflammation of the breast gland Small and deep-set nipples erect themselves best if during pregnancy a ring of horn or wood be worn, in the aperture of which the nipple may be placed Inflammation of the nipple at first requires lotions of cold water with a little spirit of red wine If they crack, HUFELAND'S ointment (*a*) is the best , but according to my experience, it ought not to be employed without putting on nipple-shields directly afterwards, for the purpose of preventing the linen sticking This disease may be often prevented, if, in the latter months of pregnancy, the nipples be frequently washed with red wine or with spirit and water A pustular eruption drying into a scab often surrounds the nipple to a greater or less extent, and occurs mostly in persons who have formerly been subject to the itch or hepatic eruptions Particular attention to cleanliness, and frequent rubbing in an ointment of hog's lard and flowers of sulphur, or, if little inflammation accompany it, frequent dabbing with solution of sublimate, is according to my experience always sufficient to prevent this eruption, and never have I been compelled to resort to a general plan of anti-hepatic treatment

For this cracking of the nipples, accompanied with so much pain, COOPER recommends a solution of borax with a little spirits of wine, HANNEY (*b*), touching with lunar caustic and wrapping in zinc ointment, from time to time, before putting the child to the breast, it is to be washed with a saturated solution of borax Upon the application of the "cosmétique infaillible et prompt contre les gerçures au sein, compose par LIEBERT," see VOLZ (*c*)

IV —OF INFLAMMATION OF THE URETHRA

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154 *Inflammation of the internal membrane of the Urethra*, vulgarly called *Clap*, (*Gonorrhœa*, *Blennorrhœa*, *Blennorrhagia*, *Urethra*, *Urethritis*, *Urethralgia*, Lat , *Tripper*, Germ , *Chaudé-pisse*, Fr ,) is produced by any irritation of the urethra by a foreign body, by gouty, rheumatic, scrofulous acrimony, but most commonly by contagion in coition

[“The disease,” says SWEDIAUR (a), “is commonly called a *Clap*, from the old French word *clapiers*, which were public shops kept and inhabited by single prostitutes, and generally confined to a particular part of the town, as we see still to-day in several great towns in Italy”—(note, p 22) He disapproves of the term gonorrhœa, as conveying an incorrect notion, and proposes the use of *Blennorrhagia*, signifying a flow of mucus WALLACE objects to the employment of either designation, and proposes, in their stead, that of *Venereal* or *Syphilitic Catarrh*, which, however, is merely a trivial alteration of the modern French name, *Catarrhe Urethrale*]

155 The symptoms and course of gonorrhœa vary considerably In men, at a shorter or longer period, usually six, eight or ten days after an impure connexion (1), there arises a tickling sensation at the orifice of the urethra, which frequently spreads over the whole glans. the lips of the orifice are generally a little swollen and inflamed (2), and the discharge of urine is painful (3) After some time a discharge takes place, at first more serious, but afterwards thick, puriform and yellowish white The pain is sometimes slight, sometimes severe, extends towards the root of the penis, which itself swells (4), the orifice of the urethra is much inflamed, excoriated, and its canal narrowed by swelling (5), the stream of urine is lessened, and frequently broken (6) Painful erections occur with bleeding from the urethra (7), and, if the spongy body itself be swollen, *painful curving of the penis* or *chordee*, (*choida*, Lat , on account of its not yielding during the erection (8) The patient often feels a heaviness in the pelvis, the scrotum, testicles, and perinæum

(a) Practical Observations on Venereal Complaints Edinburgh, 1788 8vo

become very tender (9), the prostate and inguinal glands, painful and swollen. The surface of the glans itself often inflames, swells, and secretes a puriform discharge (*balanitis*). The foreskin frequently inflames and becomes so swollen that it cannot be brought backwards over the glans (*phimosis*), or, if this have been forcibly effected, it remains constricted, behind the glans (*paraphimosis*). The puriform fluid discharged from the urethra is, in active inflammation, of small quantity, discoloured, greenish, even blackish (10,) and is not unfrequently wholly suppressed, (*dry gonorrhœa*,) febrile symptoms, inflammation of the testicles, of the eyes, and swellings of the joints ensue. In very acute gonorrhœa the inflammation may be continued even to the bladder, and produce dangerous retention of urine (11).

(1) HUNTER says, on this point — “In the gonorrhœa the times of appearance are very different, I have had reason to believe that in some the poison has taken effect in a few hours, while in others it has been six weeks,” however, “six, eight, ten, or twelve days would appear to be the most common period” (p 32.) ASTLEY COOPER says he has known gonorrhœa to “occur within twenty-four hours after connexion, and sometimes a fortnight, or a longer time will elapse before it appears. I have known an instance in which it was delayed fourteen weeks, in consequence, I believe, of the general indisposition of the patient” (p 189.)

(2) “The first symptom which takes place,” says ASTLEY COOPER, “is a pouting state of the lips of the urethra, arising from inflammation” (p 190.)

(3) HUNTER observes, that “there is often no pain till some time after the appearance of the discharge, and other symptoms, and, in many gonorrhœas, there is hardly any pain at all, even when the discharge is very considerable * * * There is generally, at this time, a greater fulness in the penis, and, more especially, in the glans, although it is not near so full as when erected, being rather in a state of half erection. Besides this fulness, the glans has a kind of transparency, especially near the beginning of the urethra, where the skin is distended, being smooth and red, resembling a ripe cherry, this is owing to the reticular membrane being loaded with a quantity of extravasated serum, and the vessels being filled with blood” (p 46.)

TRAVERS (a) says, that “heat in urining, titillation, tumefaction, which often precede the appearance of the discharge, even for days, may sometimes be removed by rest, purging, and mucilaginous drinks, so that the inflammation is subdued before it reaches purulent secretion. Coition in this state infallibly produces discharge, sometimes with a full, thick, high-coloured discharge, there is neither heat, swelling, nor colour of the *labia urethræ*. These symptoms, on the other hand, may be all considerable, with a thin and scanty discharge, and often without any heat. These differences are only to be explained by reference to the condition and susceptibility, local or general, of the person infected” (p 7.)

(4) According to HUNTER, “When the disease attacks the urethra, it seldom extends further than an inch and a-half, or two inches at most, within the orifice, which distance appears to be truly specific, and what I have called the *specific extent of the inflammation* * * * When the gonorrhœa (exclusive of the affections arising from sympathy) is not more violent than I have described, it may be called *common* or *simple venereal gonorrhœa*, but, if the patient is very susceptible of such irritation, or of any other mode of action which may accompany the venereal, then the symptoms are, in proportion, more violent. In such circumstances, we sometimes find the irritation and inflammation exceed the specific distance, and extend through the whole of the urethra” (pp 54, 5.)

As to the actual seat of the discharge in the male, HUNTER says — “As it would appear that there is hardly a sufficient surface of the urethra inflamed to give the quantity of matter that is often produced, especially when we consider that the inflammation in common goes no further than two or three inches from the external orifice, it is natural to suppose that the discharge is produced from other parts, the office of which is to form mucus for natural purposes, and which are, therefore, more

capable of producing a great quantity upon slight irritations, which hardly rise to inflammation. These parts, I have observed, are the glands of the urethra. In many cases, where the glands have not been, after death, so much swelled as to be felt externally, and where I have had the opportunity of examining the urethra of those who have had this complaint upon them, I have always been able to discover that the ducts or lacunæ leading from them, were loaded with matter, and were more visible than in their natural state, I have observed, too, that the formation of the matter is not confined to these glands entirely, for the inner surface of the urethra is commonly in such a state as not to be able to suffer the urine to pass without giving considerable pain, and, therefore, most probably, this internal membrane is also affected in such a manner as to secrete a matter. This discharge, in common cases, would seem not to rise much further back in the urethra than where the pain is felt, although it is commonly believed that it comes from the whole of the canal, and even from COWPER's and the prostate glands, not excepting what are called the *vesiculae seminales*" (pp 50, 51)

ASTLEY COOPER asserts, that "the cause of gonorrhœa is undoubtedly inflammation of the *lacunæ* of the urethra, and particularly of the *lacuna magna*. The inflammation is of the erysipelatous kind, but there is no appearance of ulceration. If ulceration were produced, the membrane of the urethra would soon give way. It is merely a secretion from the mouths of the vessels, ulceration does take place in the *lacunæ*, but not in the urethra itself" [COOPER certainly does not here wish it inferred that this ulceration of the *lacunæ* is more than accidental, or that it has any thing to do with the gonorrhœa — J F S] From the opportunity which COOPER had of examining a person who had been executed whilst affected with gonorrhœa, he states, that "the inflammation had extended down to the bulb of the urethra, for an inch or an inch and a-half down, the urethra was exceedingly red, and there was some effusion of matter on the internal surface, the urethra was red at the bulb, but not of so deep a colour. The inflammation, therefore, is not confined to an inch or an inch and a half down the urethra, but often extends over the bulb, and in this way produces strictures" (p 190)

(5) Not unfrequently small swellings are noticed externally in the neighbourhood of the urethra, which, HUNTER thinks, are enlargement of its glands, they sometimes suppurate and burst externally, but at other times internally. HUNTER has well described them — "At times swelling very considerably, even to the size of a small flattened nut, inflaming, and then a gush of matter flowing from the urethra, they almost immediately subside. The discharge has continued for some time gradually diminishing, till it has entirely gone off, and the tumour been almost wholly reduced, yet, some months after, it has swelled in the same manner again, and terminated in the same way." There can be no doubt of the correctness of his suspicions, that "these tumours are the ducts or *lacunæ* of the glands of the urethra, distended with their mucus, from the mouth of the duct being closed, in a manner similar to what happens to the duct leading from the lacrymal sac to the nose, and, in consequence of the distention of the ducts or *lacunæ*, inflammation and suppuration come on, and ulceration takes place, which opens a way into the urethra, but this opening soon closes up, and this occasions a return" (p 48)

(6) "The fear the patient is in," says HUNTER, "when he is making water, assists in diminishing the stream of urine. The stream, as it flows from the urethra, is generally much scattered and broken the moment it leaves the passage, which is owing to the internal canal having become irregular, and is not peculiar to a venereal gonorrhœa, but common to every disease of the urethra that alters the exact and natural figure of the canal, even although the irregularity is very far back, as we find in many diseased and prostate glands" (p 47)

(7) "The bleeding," COOPER (a) observes, is "generally from that part of the urethra opposite to the *symphysis pubis*." They are generally serviceable, "but, when they produce fainting, and, as soon as the person recovers from that state the haemorrhage recurs, and that for two or three times, it must be checked."

"When the inflammation is violent," HUNTER observes, "it often happens that some vessels of the urethra burst, and a discharge of blood ensues, which is in greater quantity at the close of making water, this, however, takes place at other times, and generally gives temporary ease sometimes this blood is in small quantity,

and only gives the matter a tinge, as I observed when treating of the colour of the discharge. The erections of the penis often stretch the part so much, as to become a cause of extravasation of blood, this extravasation generally increases the soreness at the time of making water, and in such a state of parts, the urethra is usually sore when pressed, yet the bleeding diminishes the inflammation, and often gives ease" (p 52)

In rare cases, the *corpus spongiosum* bursts, and a little swelling, caused by the extravasated blood, is observed externally, which, however, is not of material consequence, and is gradually absorbed. But I may here mention, that I once saw a case, under my colleague MacLMURDO's care, in which there was enormous extravasation of blood, from bursting of some vessel in the penis, during the act of coition, and the result of which was, the penis especially and the perinæum were greatly distended, and he was unable to pass his urine without extreme pain, in consequence of which a catheter was introduced. In the course of two or three days, extravasation of urine ensued, and the bladder was punctured through the rectum. Considerable sloughing, not only in the perinæum, but also up into the groins, took place, into which incisions were made, as needed, and he ultimately, though slowly, recovered — J F S

(8) HUNTER divides chordee into inflammatory and spasmodic — "When the inflammation is not confined merely to the surface of the urethra and its glands, but goes deeper, and affects the recticular membrane, it produces in it an extravasation of coagulable lymph, as in the adhesive inflammation, which, uniting the cells together, destroys the power of distention of the *corpus spongiosum urethrae*, and makes it unequal in this respect to the *corpora cavernosa penis*, and therefore a curvature on that side takes place in time of erection, which is called a chordee" * * * As it arises from a greater degree of inflammation than common, it is an effect which may, and often does, remain after all infection is gone, being merely a consequence of the adhesive inflammation. The spasmodic chordee arises from spasm, at least, it cannot proceed from the same cause with the other, if my idea of that complaint be well founded. The spasmodic chordee comes and goes, but at no stated times, at one time there will be an erection entirely free from it, at another it will be severely felt, and this will often happen at short intervals" (pp 52, 3)

ABERNETHY (a) mentions "another, and more permanent, kind of chordee, which arises from inflammation having been propagated to the *corpus spongiosum*, coagulable lymph is thrown out, which glues the cellular tissue together, prevents that part of the *corpus spongiosum* being injected with blood during the erection of the penis, and occasions it to be crooked and bent towards the contracted side. This forms a true and permanent chordee"

HUNTER also speaks of "a soreness often felt by the patient all along the under side of the penis, owing to the inflamed state of the urethra. This soreness often extends as far as the anus, and gives great pain, principally in erection, yet it is different from a chordee, the penis remaining straight. With most gonorrhœas there is a frequency in the erections, arising from the irritation at the time, which often approach to a priapism, especially when there is the above-mentioned soreness, or when there is a chordee" (p 48)

(9) HUNTER says he has "seen cases where the irritation has extended so far as to affect with real pain the thighs, the buttocks, and the abdominal muscles, so that the patient has been obliged to lie quiet in a horizontal position, the pain has, at times, been so considerable as to make him cry out, and the parts have been very sore to the touch, they have even swelled, but the swelling has not been of the inflammatory kind, for, though there was a visible fulness, yet the parts were rather soft" (p 54)

(10) These changes in colour, HUNTER considers, "depend on the increase or decrease of the inflammation, and not on the poisonous quality of the matter itself, for any irritation on these parts, equal to that produced in a gonorrhœa, will produce the same appearances" * * * It is very probable that there is a small extravasation of red blood in all cases where the matter deviates from the common colour, and to this the different tinges seem to be owing * * * It has often a smell seemingly peculiar to itself" (p 56)

(11) I have seen retention of urine from severe gonorrhœa, in which it was thought

necessary to introduce a catheter, a practice, however, which I do not approve of, and I think might be evaded by warm baths, leeching, and purging — J F S

HUNTER, however, mentions the very contrary condition from the extension of the inflammation. He says, "When the bladder is affected it becomes more susceptible of every kind of irritation, so that very disagreeable symptoms are often produced it will not allow of the usual distension, and therefore the patient cannot retain his water the ordinary time, and the moment the desire of making water takes place, he is obliged instantly to make it, with violent pain in the bladder, and still more in the glans penis, exactly similar to what happens in a fit of the stone. If the bladder be not allowed to discharge its contents immediately, the pain becomes almost intolerable, and even when the water is evacuated, there remains, for some time, a considerable pain both in the bladder and glans, because the very action of the muscular coat of the bladder becomes a cause of pain by its own contraction. The ureters, and even the kidneys, sometimes sympathize, when the bladder is either very much inflamed, or under a considerable degree of irritation, however, this but rarely happens, and, if it should take place with any degree of violence, I should suppose that the stomach would also become affected, and of course the whole constitution. I have even reason to suspect that the irritation may be communicated to the peritonæum by means of the *vas deferens* * * * When the inflammation, or perhaps only the irritation, runs along, * * * the disease is generally very violent, and I suspect is something of the erysipelatous kind, at least it shows an irritable sympathizing habit" (pp 55, 6)

The constitution scarcely ever is primarily affected on the incursion of gonorrhœa, but HUNTER mentions one very remarkable case of this kind, in which the patient, during six weeks between "the time it was possible for him to have contracted the disease, and its appearance," had, "for a considerable part of that time, often been indisposed with slight rigors, attended with a little fever and restlessness, for which he could assign no cause, nor was he relieved by the usual remedies prescribed in such cases. A violent gonorrhœa came on, and these symptoms went off." In a second attack which the same person suffered, "it was a month from the time of infection before the gonorrhœa appeared, and for some weeks of that time he was subject to a similar indisposition, which went off, as before, when the running came on. Here, it would appear, that we have something of a suppurative fever, which, perhaps, often happens in this disease, but the inflammation being small, and the fever, therefore, inconsiderable, it is commonly but little noticed by the patient" (p 73)

156 The continuance of these symptoms varies. In slight cases they soon pass by, the discharge gradually diminishes, and (under proper management, commonly in from three to four weeks) completely ceases. Frequently, it becomes chronic, and the discharge (*gleet*) assumes a thin serousropy character, appears in very small quantity, especially in the morning, after emptying the bladder or after any irritation, and may in this state continue for many months or even years.

[“The discharge from gonorrhœa is very much affected by constitutional causes,” says ASTLEY COOPER. Thus, if with “abundant discharge, considerable pain, and even chordee, the patient should get a fever, the discharge disappears, the pain ceases, and he will be entirely free from all symptoms of the disease for a period of from seventeen to twenty days. As soon, however, as he begins to recover from his fever, the discharge of matter will recur, the pain and chordee return, and a long time may elapse before the disease can be removed” (p 191)]

157 The consequences of gonorrhœa by the changes it produces on the mucous membrane of the urethra are thickening, narrowing, stricture, and swelling of the prostate gland.

158 In the female the vagina is the seat of gonorrhœa. The inflammation spreads externally upon the labia, urethra and clitoris. Painful tickling arises in these parts, and soon a copious flow of differently conditioned mucus takes place which produces excoriation, and the gonor-

rhœa is easily propagated to the rectum (1) The voidance of urine is painful The symptoms of gonorrhœa are generally less distinct in women than in men , the mucous discharge, however, soon becomes chronic and very obstinate The detailed symptoms, the manner of its origin, as well as the occurrence of menstruation and the unchanged colour of the face, distinguish female gonorrhœa from the whites (*fluor albus vel leucorrhœa*) (2)

[(1) When the urethra had been affected with the disease, RICORD states, that "on introducing the finger into the vagina, and pressing the convexity of the urethra, pus was seen to proceed from the interior of the canal, whose surface, as seen through the *meatus urinarius*, appeared swollen" (p 173, Fr edit, p 332) "The acute urethritis is seldom accompanied by retention of urine, and, when it does exist, it is generally of short duration, and yields to antiphlogistic treatment, but nevertheless, sometimes it requires the use of the catheter, which ought to be introduced with the parts exposed, notwithstanding the objections raised, as less pain will be caused than if the surgeon have to feel his way" (p 322, Fr edit, p 678)

In the five cases which RICORD describes as utero-vaginal gonorrhœa, and which inoculation proved not to be syphilitic, there was, besides a purulent discharge from the mouth of the womb, upon the *cervix uteri*, "either an ulceration in form of a blister, (p 161, Fr edit, p 310,) or several points deeply eroded with a grayish surface, covered with albuminous adhering secretion (p 162, Fr edit, p 313,) or a bleeding ulceration (p 166, Fr edit, p 320,) or a superficial granulated ulceration, penetrating to the cavity of the *cervix uteri* (p 172, Fr edit, p 332,) or erosion at several points, as in some cases of balanitis" (p 175, Fr edit, p 335)

HUNTER says that "sometimes the bladder sympathizes, producing the same symptoms as in men, and it is probable that the irritation may be communicated to the kidneys It has been asserted that the ovaria are sometimes affected in a similar way to the testicles in men , I have never seen a case of this kind, and I should very much doubt of its existence, for we have no instance in other diseases of the ovaria sympathizing with those parts or at least producing such symptoms as would enable us to determine they did" (p 68) RICORD, however, does believe in the occurrence of ovaritis as a complication of gonorrhœa, and speaks of its treatment

Not unfrequently the labia swell under a sharp attack of gonorrhœa, and the nymphæ, together with the *præputium clitoridis*, become infiltrated with serum and of considerable size, giving to the latter an appearance of being twisted, similar to that sometimes observed in phimosis, or paraphimosis, in the male Hence RICORD compares it to "a kind of phimosis or paraphimosis," and he speaks of it as occasionally terminating in gangrene, which, however, I do not recollect to have observed

Abscesses in the labia or nymphæ are not of unfrequent occurrence as concomitants with gonorrhœa, and HUNTER considers them "as similar to the inflammation and suppurations of the glands of the urethra in men" (p 68) RICORD speaks of simple abscesses complicating urethro-genital gonorrhœa, but I cannot clearly make out whether he refers to the labial or nymphal-abscesses just mentioned, or to abscess actually in the vagina itself, if the latter, I have never seen the disease He says—"These abscesses sometimes depend upon the inflammation of the cysts which some women have at the entrance of the vulva, in all cases they ought to be promptly opened It should be noted that suppuration here quickly succeeds to inflammation, and if the pus be not allowed to escape, infiltration of the loose cellular tissue surrounding the rectum, and, lastly, perforation of this intestine, thus forming either complete or incomplete fistules" (p 323, Fr edit, p 680)

(2) The distinction between clap and the whites in women is by no means so easy as CHELIUS presumes, indeed, according to Dr Locock's (*a*) account of the latter, it is scarcely possible to distinguish them, except by the history, which is not always to be relied on Locock says—"the discharge of simple leucorrhœa is mucous—merely an increase of the natural moisture of the part , it becomes more abundant than in health, but retains its character of mucus, being clear, transparent, colourless and glutinous to the touch This rarely goes on to a great extent with-

(a) See his article on *Leucorrhœa* , in Cyclopædia of Practical Medicine, vol III

out being altered in its appearance, and much more watery. In general this sort of discharge is accompanied with but moderate symptoms, is more gradual in its progress, and is unattended with pain, there is little or no inflammatory action present. In other cases the discharge is whitish and opaque, becomes creamy when rubbed between the fingers, and rendering water turbid. This sort of discharge has been considered by SIR CHARLES M CLARKE and others to depend on an inflamed condition of the *cervix uteri*, it is rarely abundant, but occasions much disorder of health and local pain. A watery discharge resembling serum is a very common result of more acute inflammatory action in the mucous surface, and, in general, appears suddenly as the effect of cold or any active excitement. It occasionally becomes very abundant, is attended with much local heat and soreness, and soon becomes puriform or mixed with purulent matter, and sometimes with bloody streaks. When it is fetid, brown, or coming away in violent gushes, organic disease of the uterus is to be feared, the nature of which can only be ascertained by an examination *per vaginam*. Purulent discharge from inflammatory action may also take place from the vagina, independent of gonorrhœa from impure connexion, and this may be said to form one variety of leucorrhœa, as, although it may often arise from organic disease of the uterus, it is not unfrequently met with in a perfectly healthy state of that organ" (p 35) "In the mildest form of the disease," Locock observes, "the menstruation is either scanty or too profuse" thus, its presence cannot be considered as distinctive of gonorrhœa, or its absence of leucorrhœa, as presumed by CICERIUS. "The most acute form of leucorrhœa is," proceeds Locock, "most commonly the effect of cold, of metastasis, or of some local irritating cause, and consists of a profuse watery or purulent discharge, accompanied with local pain and soreness, the vagina is hot, very tender to the touch" * * *. All these forms may end in chronic leucorrhœa, where the discharge is more or less profuse and constant, mucous, or purulent, or a mixture, of both, it may become green and offensive, and yet may be the result only of functional disorder. The quantity poured out is sometimes very abundant, even to the extent of a pint and a half in twenty-four hours, it will then be expelled in gushes in any change of posture" (p 36) Unless the symptoms of debility resulting from this state of things be checked, the patient dies exhausted.

In summing up, Locock makes the following excellent and judicious observations—"It is important to be able to distinguish between gonorrhœa and common leucorrhœa, * * *, but it is very doubtful whether any very accurate diagnosis can be formed. It has been stated that in a recent gonorrhœa, there is *ardor urinæ* which does not accompany leucorrhœa, unless unusually acrid. But how are we to distinguish in a case of this unusually acrid leucorrhœa, or where a gonorrhœa is not recent? The redness and tumefaction of the labia, hympha, &c, can only be seen in a recent gonorrhœa, and they may be seen in severe cases of leucorrhœa, particularly in those following local irritation, or possessing more acute inflammatory action. One other test is mentioned by authors, that in leucorrhœa the discharge ceases during menstruation, but does not in gonorrhœa. This, however, is denied by other authors, and, as Dr JEWEL observes, "this is a point which cannot easily be decided, as, from the colour of the menstrual secretion, that of the leucorrhœal or gonorrhœal must necessarily be in a great measure obliterated" (pp 38, 9)

It will be here convenient to notice the *pudendal discharges* which occur very frequently in female children soon after birth, which are generally purulent, and produce redness and swelling of the external generative organs, and not seldom accompanied with excoriation and sloughing of the skin, which may, as I have seen it, more than once or twice, extend to the upper part of the thighs, in consequence of the irritating nature of the discharge. Locock says—"It is very apt to occur also during dentition, and not only when the first set of teeth are in progress, but at the time of the second set, and even when the *dentes sapientia* are irritating the system at a mature age" (p 39) I do not recollect to have noticed it at these latter periods, but have no doubt of the correctness of Locock's observation.

A knowledge of this occurrence is highly necessary, and is very properly insisted on, as there is no doubt that many men have suffered capital punishment from the ignorance of practitioners on this point. And, even now, with our better knowledge it is by no means unfrequent to hear of medical men giving a decided opinion which is almost certainly erroneous, upon the gonorrhœal character of pudendal discharges, and thus jeopardizing the character, if not the life, of an innocent person.

On all occasions of giving opinion or evidence in such cases the practitioner is bound to speak with extreme caution, and only upon the most incontestable proof, which, on the mere examination of the parts, it is almost impossible for him to attain, to make a positive statement as to the gonorrhœal character of the discharge.

It is also to be remembered that an epidemic vaginal catarrh has occasionally happened, as mentioned by Dr PERCIVAL (*a*.) at Manchester, in 1791, by Dr FERRIAR (*b*.) in 1789 and 1790, by Dr MACKINTOSH (*c*.) at Edinburgh, by KINDER Wood (*d*.) at Oldham, in 1815, and by CAPURON (*e*)

159 As to the *nature* of gonorrhœa (*1*) and its connexion with the venereal disease, the following distinctions are laid down —

1 Gonorrhœa *arising without infection from external injury*, for instance, hard riding, blows upon the urethra, onanism, too frequent connexion, introduction of foreign bodies into the urethra and so on, or *from internal disturbance*, as herpetic, or gouty humours, repelled eruptions, suppressed secretions and so on (*2*)

2 Gonorrhœa *depending on peculiar contagious matter*, the influence of which, however, does not spread beyond the urethra (*3*)

3 Gonorrhœa *which has a venereal origin*, rather as consequence of general venereal disease, or as a primary syphilitic affection with or without ulceration This kind of gonorrhœa may pass into general venereal disease (*4*)

[*(1)*] The only kinds of gonorrhœa which can be admitted are two, the *gonorrhœa benigna* and *gonorrhœa virulenta*, "the terms *benigna* and *virulenta*," as LAWRENCE (*f*) observes, "not indicating the mildness or severity of the symptoms, but denoting the causes which produce those symptoms. *Virulenta* generally means that which is produced by the morbid or poisonous state of gonorrhœa, the other term (*benigna*) indicates any other cause that may excite inflammation of the urethra" (p 776)

(2) HUNTER (*g*) even observes, that "sometimes discharges happen spontaneously, when no immediate cause can be assigned, such may be called *simple gonorrhœas*, and have nothing of the venereal infection in them, though those that have been formerly subject to virulent gonorrhœas are most liable to them" (p 34) He mentions, (*h*) also, are markable case arising from sympathy with the cutting of a tooth "A boy, about two years of age, was taken with a pain and difficulty in making water, and voided *matter from the urethra*. I suspected, by some means or other, this child might possibly be affected by the venereal poison, and the suspicion naturally fell on the nurse. These complaints sometimes abated, and would go off altogether, and then return again. It was observed, at last, that they returned only upon his cutting a new tooth. This happened so often, regularly and constantly, that there was no reason to doubt but that it was owing to that cause" (p 245)

EVERARD HOME (*i*) says, he has "known a simple gonorrhœa to be brought on by the internal use of arsenic, and to continue for some time after that medicine has been left off, and then disappear. He has also known it to be a consequence of the internal use of ginger" (*note*, p 35)

The discharge from the urethra which often arises in men after connexion with their wives, whilst labouring under leucorrhœa either in its mild or acute form, may be placed under this head. It sometimes is very severe. HUNTER mentions a case of this kind. "The parties have been married these twenty years and upwards, the wife has, for many years past, been at times troubled with the *fluor albus*

(*a*) On the Uncertainty in the External Signs of Rape, in Medical Ethics, Notes and Illustrations to, p 231 Manchester, 1803, 8vo

(*b*) Medical Histories and Reflections Warrington, 1792 8vo 2d Edit (here quoted,) vol 1, p 169 London, 1810 4 vols 8vo

(*c*) Elements of Pathology and Practice of Physic, vol 11 p 303 Edinburgh, 1830 2 vols 8vo

(*d*) History of a very fatal affection of the

Pudendum of Female Children, in Med Chir Trans, vol 11 p 84

(*e*) Traité des Maladies des Femmes de puis la Puberté, &c Paris, 1817. 8vo p 212

(*f*) Lectures in Lancet, above quoted, 1830, vol ii

(*g*) On the Venereal Disease

(*h*) The Natural History of the Human Teeth, &c London, 1830 3d Edition 4to

(*i*) J HUNTER on Venereal Disease

When he has connexion with her at such times, it generally, though not always, produces an excoriation of the glans and prepuce, and a considerable discharge from the urethra, attended with a slight pain. These symptoms commonly take a considerable time to go off, whether treated as a gonorrhœa or as a "weakness." HUNTER asks "Is this a new poison?" and does it go no farther because the connexion takes place only between two? What would be the consequence if she were to have connexion with other men, and these with other women? or if he were to be connected with other women? Such cases, as far as I have seen, have only been in form of a gonorrhœa, they have not produced sores in the parts, nor, as far as I know, do they ever produce constitutional diseases" (p 65) All the discharges above enumerated must be included under the designation of *gonorrhœa benigna seu simplex*

(3) With regard to the second kind of gonorrhœa, mentioned by CHELIUS as "depending on peculiar contagious matter," it is doubtless the so-called *gonorrhœa virulenta*, but I cannot agree with him that its "influence does not spread beyond the urethra," as, from the observations of other surgeons, as well as from my own, I am convinced that, in certain persons, it does become a constitutional disease, and exhibit distinctive characters, although even LAWRENCE says that "gonorrhœa consists of inflammation of a mucous surface, that of the urethra or vagina going through a certain course, coming to a natural end, and not attended with further effect than those which immediately occur in the parts conceived" (p 810)

[The following observation of ABERNETHY's, is too important to pass by as coming from so high an authority, though I do not agree with it "I am ready to affirm," says he, "that I have of late years seen as little of what was called *Gonorrhœa virulenta* when I was a young surgeon as I have of the syphilitic chancre. The *Gonorrhœa virulenta* was a most active inflammation in the front part of the urethra, the discharge was of very thick pus, having a peculiar and very fetid odour. The disease began by degrees, but soon attained a considerable height, and continued on an average for three weeks, at which time, or shortly afterwards, the inflammatory actions ceased, the discharge became less consistent, and lost its characteristic fetor. The running, however, still continued, and occasionally for a great length of time, rather, as it appeared, in consequence of the disturbance induced, than as an immediate effect of the disease, for I have known instances where the gonorrhœa has ceased without leaving any afterclap or gleet, and many in which this symptom, when it occurred, has been of very short duration" (p 276)]

(4) It seems now generally admitted that gonorrhœa and syphilis are two decidedly distinct diseases, and therefore CHELIUS's third division, "Gonorrhœa with a venereal origin," will not hold. The question of the identity of the diseases has been long and fiercely disputed in the schools, but the observations and experiments of HERVANDEZ and RICORD have, to my mind, however, put the matter completely at rest.

Of the existence of gonorrhœa, at least as early as the beginning of the 14th century, there seems to me no doubt. BECKETT (a,) indeed, says, (quoting from Stow's Survey of London,) as early as the year 1162, "divers constitutions relating to the Lordship of Winchester were to be kept for ever according to the customs from time immemorial, among which it is ordered, that 'no steward keep any woman that hath the perilous infirmity of burning'" JOHN OF GATESDEN, who practised about the year 1320, and was a fellow of Merton College, Oxford, wrote the *Rosa Anglica*, in which, among other things, he treats *De Leprâ*, and, in one of the sections on this subject, entitled, "De infectione ex coitu leprosi vel leprose," he says, "Primo notandum ut ille qui timet de excoriatione et arsua viugæ post coitum statim lavet virginem cum aqua mixta aceto vel cum urina propria et nihil malum habebit. Secundo, oportet dicere mulieri supposse ut saltet retro, descendat fortiter per gradus et sternutet cum pulvere piperis vel cum penna in acetato in naribus, ita ut sperma prius receptum descendat, et tunc lavet se in decoctione rosæ et plantaginis decoctarum in vino et fufure, et tunc erit secura" (p 61)(b) JOHN OF ARDEN, who lived through the greater part of this century, and at the age of seventy years, in the year 1377, wrote "propria sua manu," the MS No 75 of the Sloanian Collection, how-

(a) An attempt to prove the Antiquity of the Venereal Disease long before the Discovery of the West Indies, in a letter to Dr JAMES DOUGLAS, in Phil Transact., 1718, No 357, p 839

(b) Edition of 1492 Pavia

ever, speaks, in another MS No 2002 of the same collection, of the disease "qui dicitur *Chaudie-pisse*," and BECKETT quotes from another MS a prescription of his, "contra *Incendium*," which I have not been able to find

On the other hand, the generality of Surgical writers presume that syphilis had not existed prior to the discovery of America, in 1492, or the siege of Naples, in 1495. I am not, however, by any means sure that even syphilis with its primary sores in shape of chancres, was not known to JOHN OF ARDEN, if not indeed also to JOHN OF GATESDEN, as hereafter I shall endeavour to prove. I have therefore merely referred to the presumed later appearance of syphilis, that I may avail myself of the opinions of those who so think, but I believe that disease existed long before. It is not, however, in reality, of much consequence, but simply a matter of literary curiosity, because the decision of the question rests not there, but upon the experiments mentioned by BENJ BELL, and more especially on those performed by HER-NANDEZ and RICORD.

"Although," HUNTER says, "it has been supposed by many, that the gonorrhœa and the chancre arise from two distinct poisons, and their opinion seems to have some foundation, when we consider only the different appearances of the two diseases, and the different methods of cure, which, in judging of the nature of many diseases, is too often all we have to go by, yet if we take up this question upon other grounds, and also have recourse to experiments, the result of which we can absolutely depend upon, we shall find this notion to be erroneous." He proceeds to inquire into the introduction of the venereal poison among the inhabitants of the South Sea Islands, combats the opinion that chancre was first introduced into Otaheite, by stating that it was "almost impossible to carry a chancre so long a voyage without its destroying the penis, while we know from experience that gonorrhœa may continue for a great length of time," and determines, for this reason, and also that "only a gonorrhœa can be cured by simple means," which seem all that the natives adopted, "that the disease they had must have been a gonorrhœa," (p 14,) and "that every form of the disease has been propagated from one root, which was most probably a gonorrhœa." He then continues—"If any doubt still remains with respect to the two diseases being of the same nature, it will be removed by considering that the matter produced in both, is of the same kind, and has the same properties, the proofs of which are that the matter of a gonorrhœa will produce either a gonorrhœa, a chancre, or the lues venerea, and the matter of a chancre will also produce either a gonorrhœa, a chancre, or the lues venerea" (p 16.) To make this circle complete he ought to show that the matter of lues venerea will produce gonorrhœa, but he distinctly states—"It has never yet been known to produce a gonorrhœa from the constitution" (p 308.) It must be here observed that HUNTER considers chancre and lues venerea two distinct forms of the disease, the one primarily exhibiting it locally, and the other only through the constitution.

"To account for these two different effects of the same poison," HUNTER observes, "it is only necessary to observe the difference in the mode of action of the parts affected when irritated, let the irritation be what it may. The gonorrhœa always proceeds from a secreting surface, and the chancre is formed on a non-secreting surface * * *. The poison, then, being the same in both cases, why do they not always happen together in the same person? * * * Although it does not often happen so, yet it sometimes does, at least there is great reason to believe so. I have seen cases where a gonorrhœa came on, and in a few days after, in some, in others in as many weeks, a chancre has appeared, and I have also seen cases where a chancre came first, and, in the course of its cure, a running and pain in making water have succeeded. It may be supposed that the two diseases arose from the original infection, and only appeared at different times. * * * I suspect," he proceeds, "that the presence of one irritation in these parts becomes, in general, a preventive of the other. I have already observed that the two parts sympathize in their diseases, and it is possible that that very sympathy may prevent the appearance of the real disease, for, if an action has already taken place which is not venereal, it is probable that this sympathy will not cease while the cause exciting it exists, and therefore, when both happen in the same person at the same time, I suspect that either the urethra never had sympathized with the chancre, or if it did at first that sympathy had ceased, and then the venereal matter might stimulate the parts to action" (pp 17, 18.) It is not at all clear what HUNTER means by this sympathy between the chancre and the urethra, or its absence, but it is very strange

that he should seem to consider the simultaneous existence of gonorrhœa and chancre rare, as it is matter of daily occurrence — J F S

BENJAMIN BELL (*a*) denies the identity of gonorrhœa and syphilis. He says — “The refusal of some patients to submit to the distress and inconvenience, the frequent result of a protracted mercurial course, and who, nevertheless, recovered from the usual symptoms of gonorrhœa, first suggested a doubt of the two diseases being produced by the same contagion * * * The symptoms and consequences of gonorrhœa are perfectly different from those which take place in lues venerea. Both diseases have appeared, at different periods, in the same countries, and, in some instances, they have remained distinct and uncombined for a great length of time” (pp 2, 3). As to the assertion “that gonorrhœa sometimes terminates in pox, and, therefore, that this of itself is a sufficient proof of the two affections being of the same nature,” he says, “Were it certain that this ever happened, no further evidence would be required, as a few well-marked instances would be conclusive, but every unprejudiced practitioner will admit that no sufficient proofs of it have ever occurred. In order to support this opinion, data must be received which we know to be inadmissible. We must admit, that a person with chancre only communicates to another, not only every symptom of pox but of gonorrhœa, and that another, with gonorrhœa only, gives to all with whom he may have connexion, chancre with their various consequences. This ought, indeed, to be a very common occurrence, insomuch that every practitioner should be able to decide upon it with certainty, if this opinion was well founded. Instead of which, it will be admitted by all, that the one disease being produced by the other is, even in appearance a very rare occurrence” (pp 6, 7). BELL subsequently observes — “As a further proof of the difference of the contagions of syphilis and gonorrhœa it may be remarked, that no stage of pox has ever been known to induce gonorrhœa, which surely would occasionally happen if the two diseases were of the same nature. We may also remark, that, in numberless instances, people have been pained by the matter of syphilis being by accident applied to a cut or a scratch, as often happens with surgeons in the dressing of chancre and buboes, but no one ever heard of a pox being got in this manner from the matter of gonorrhœa. It has been said that chancre may be produced by insinuating the matter of gonorrhœa beneath the skin. But experiments upon this subject are productive of such anxiety and distress, that they never have been, nor ever probably will be, repeated so frequently, as the nature of it would require” (pp 32, 3). He, however, mentions some experiments made by two young gentlemen upon themselves with a view to ascertain the point in dispute * * *. By the introduction of the matter of chancre as well as of buboes into the urethra, some pain and irritation were excited, but *no gonorrhœa ensued*, and, by fretting the skin of the prepuce and glans with a lancet, and rubbing the parts with the matter of gonorrhœa, slight sores were produced, but they never assumed the appearance of chancre, and healed easily without mercury” (p 34).

BELL flatly denies HUNTER’s assertion, that “at Otaheite every form of the (venereal) disease has been propagated from one root, which, most probably, was a gonorrhœa,” by his statement, “when Captain Cook visited these islands, in his second voyage we have authority for saying that *gonorrhœa* had not then appeared in them” (p 36).

Having thus given an abstract of the opinions of HUNTER and BELL as to the dispute on the identity of gonorrhœa with syphilis, it only remains to show that BELL’s opinion that, for the reasons above assigned, experiments upon this subject “never probably will be repeated so frequently as the nature of the case requires,” can no longer be maintained, as most conclusive experiments have been most ably and numerously made by HERNANDEZ and RICORD, by which the distinct nature of the two diseases is completely proved.

HERNANDEZ (*b*) had the opportunity of making his observations on galley-slaves, over whom he had perfect control. From these he selected three who had gonorrhœa, to furnish the necessary virus with which he experimented, and he justly observes — “These experiments, made on seventeen persons are the most numerous and perhaps the most careful that have been made, and furnish important results. In five of these cases the cure was quick, without internal remedies, and without

(a) Quoted at the head of this article, vol 1. *Virus Gonorrhœique et Syphilitique Tou-*

(b) *Essai Analytique sur la Néphrite des Hommes*, 1812. Quoted from RICORD

the ulcers having any venereal appearance. In the others, there were obstinate ulcers, some possessing quite the syphilitic appearance, accompanied with general symptoms which seemed to confirm it. Surely such proofs did not exist in the cases I have mentioned, and yet they were regarded as decisive. Yet all depended upon known internal disorders, all the ulcers yielded to means calculated to destroy these disorders, but which have no virtue in syphilis. * * * My experiments prove that the ulcers which are produced, by inoculating the gonorrhœal virus, are not syphilitic, and at the same time point out the source of errors which may render these experiments, which appear so simple and decisive, of little value. They show how circumstances may change the nature of ulcers, or disguise them, and to such degree that it may easily impose on inattentive observers who do not foresee these cases of complication" (pp 48, 9, Fr edit, pp 112-13)

The assertion that "one woman, having connexion with several men, could give chancres to some, and to others gonorrhœas and buboes, whence the conclusion as to the identity of the nature of these different actions, the principle being always the same in all, and the difference only in the form determined by the locality and degree in which the cause acts," is now completely disproved by RICORD's observations — "If such reasoning have remained for a length of time without refutation, it cannot," says he, "be now persisted in. Since I have applied the *speculum uteri* to the study of venereal diseases, the hitherto inexplicable enigmas are reduced to the most common and simple facts. With the aid of this instrument I have found that a woman may be affected, at the same time, with gonorrhœa and deep chancres of the vagina or uterus and the gonorrhœa alone show itself externally, apparently affected with gonorrhœa, she could very easily communicate chancres and gonorrhœa together, or only one of them, according to the predisposition of the persons who exposed themselves to the infection. But we can affirm, and from numerous observations, that whenever we have examined women who have communicated disease, we never found that a chancre had been produced by a discharge without ulceration in the sexual organs of the person who had communicated. Inoculation has confirmed what observation of ordinary contagion, better made with the assistance of the *speculum*, had established. In women, gonorrhœa, considered throughout, in the whole extent of the organs of generation, in its different phases of acuteness or duration, and inoculated in the same manner as employed for chancre, produced no result, whenever the mucous membrane was not actually the seat of chancre" (pp 52, 3, Fr edit, pp 118, 19)

In reference to the opinion that "the cause of chancre and gonorrhœa being the same, the difference in the form depended upon the tissues affected, and that thus the syphilitic virus applied to a non-secreting surface produced a chancre, and the pus of chancre, upon mucous membranes only produced gonorrhœa," RICORD says, positively — "We know that gonorrhœal matter never produces chancre on the skin, and that, applied to mucous surfaces, when it acts, it only produces a discharge. The gonorrhœal secretion, applied to the mucous membrane of the eye, has never produced chancres of the conjunctive coat, or of the eyelids, nor, on the other hand, has the muco-purulent secretion of gonorrhœal ophthalmia ever produced chancres by inoculation or otherwise, although the eye-lids are susceptible of being affected by chancre. We may add that the muco-pus of a balanitis or posthitis, consequent on an impure coition, or produced artificially by an irritant, has never furnished a result by inoculation, and that these affections, therefore, cannot be followed by symptoms of constitutional pox, whenever they have existed without chancres" (p 58, Fr edit, pp 129-31). In regard to the two "pretty frequent and regular consecutive symptoms of gonorrhœa, buboes, (yet far less frequent than after chancre,) and swelled testicle, I have ascertained, by inoculation, that the pus from such buboes, being then in similar condition, does not inoculate, which, in this case, rarely terminate in suppuration, and with engorgements, or simple abscesses, the characters of which frequently correspond to strumous and not syphilitic affections. As to swelled testicle, which still more rarely suppurates, the pus never produced any thing by inoculation" (p 58, Fr edit, p 132)

The following are the inferences which RICORD draws from his observations on the inoculation of gonorrhœal matter —

"1. The matter of gonorrhœa, applied to a healthy mucous membrane, causes gonorrhœal inflammation, so much the more easily, the nearer it approaches the purulent form, and therefore, contrary to the opinion of WHATELEY, the less mucous its nature.

"2 Under no circumstances can it produce chancre, but, as an irritating matter, like that of eoryza for instance, it may excoriate the skin, with which it remains some time in contact, but it never produces a specific ulcer

"3 The consecutive, undoubted, and regular symptoms of gonorrhœa do not furnish an inoculable pus

"4 The symptoms of constitutional syphilis are not the consequence of gonorrhœa. In all the cases in which authors mention that it was an antecedent, the frequency of which precisely corresponds with that of masked chancre, (*chancre larves*), the diagnosis was not correct, the diseased surfaces not having been examined

"5 Lastly, the only correct means of diagnosis, in the present state of science, is inoculation. Every gonorrhœa which is tested by inoculation in its various periods, without producing any result, is only a simple affection, and incapable of communicating syphilis, whether primary in another subject, or constitutional in the one first affected" (p 59; Fr edit, p 133)

It is very commonly held by those who consider gonorrhœa and syphilis as distinct diseases, that in the former there was not ulceration, the gonorrhœa being, as described by WALLACE (a), a "diffused and superficial disease, with increased and altered secretion, but *without loss of substance* or ulceration" (p 233). But, as RICORD observes, it is well known and proved by pathological anatomy, that, as the speculum shows us every day, gonorrhœa is often accompanied or followed by erosions, or more or less extensive destructions of the mucous membranes, but the ulcerated form of gonorrhœa, if I may thus express myself, does not render it more capable of being inoculated than that which is not, the gonorrhœal ulcers being essentially distinct from chancre" (p 53, Fr edit, p 119)

The best account of gonorrhœal sores and their consequences is certainly that given by TRAVERS (b)

"The distinguishing features of sores produced by gonorrhœal matter are," says TRAVERS, "circularity, flatness without induration, whether raised or level, with the surface, seldom solitary, often several, the greater frequency on the anterior and posterior verge of the prepuce, or beside the frenum, i.e. at the angles of reflection between the layers of the prepuce, or the close and loose investment of the glans, than elsewhere. In the female, they are likewise commonly situated at the junction of the mucous with the cuticular membrane upon the labia, or at their inferior commissure. Their margin is blunt, but not indurated, the character of the granulation is spongy and indolent, and, though they clean readily, they heal slowly" (p 13)

"The proper gonorrhœa, or inflammatory secretion from the sound mucous lining of the urethra, while confined to it," says TRAVERS, "is incapable of producing secondary symptoms to the individual, its bubo, if present, is sympathetic, so is the sore throat, or inflamed membrane of the eye or nose, if one or all should follow, i.e. they have no character but that of simple and superficial membranous inflammation. As these unquestionably do sometimes follow, though in so slight a degree as to be scarcely noticeable, the circumstance can only be explained by attributing it to the same *consensus partium* which determines the selection of these parts for the specific appearances when the matter of secretion is absorbed, and acts as a morbid poison. But, when the matter of gonorrhœa is absorbed by an excoriated surface, and this surface becomes an ulcer, the matter which it secretes is capable of producing, by its absorption into the system, secondary symptoms in the individual. The absence of secondary symptoms in pure gonorrhœa depends, therefore, not upon any difference in the quality of the matter, but upon a law of the animal economy, that the *inflammatory secretions of the sound surface are not absorbed into the system*" (pp 10, 11)

"The secondary symptoms of the gonorrhœal sore are as strongly marked," continues TRAVERS, "present as distinct a character as those of lues. The glands in the groin are often large and indurated, than otherwise, in protracted cases, but, as in proper gonorrhœa, the affection is sympathetic. The appearance of secondary symptoms is certainly not peculiar to these cases. The inflammation of the *velum palati* and uvula is diffuse and superficial, the surface is roughened with innumerable small and shallow indentations where ulceration has taken place. They are so

(a) Quoted at the head of the article

(b) Above cited

slight as often to escape ordinary observation. They are seen chiefly upon the tonsils, uvula, apex, and edges of the tongue * * * The gonorrhœal sore throat is accompanied by considerable irritability to stimulant fluids especially. The exacerbated ulcer of lues, with its abrupt high-coloured margin, is not more strongly characterized, or more readily distinguished. The cutaneous affections are slight, and, in character, presenting less variety than those of lues, so far as my observation enables me to speak. The papular and squamous are the most common, the pustular and tubercular occasional. The lichen and psoriasis upon the trunk and limbs, and the achor and acne indurata thickly distributed upon the face and the verge of the hairy scalp, are the forms which I have chiefly recognised" (pp 14, 15.)

With regard to the gonorrhœal sore throat, since it was first pointed out, many years since, by TRAVERS, I have continually observed it, I think quite as frequently when there was merely discharge without any sore, as when with it, and so surely does it accompany gonorrhœa that, if perceived in the throat, I invariably inquire if the patient have a clap, and scarcely remember to have found it absent. I think it has a very close resemblance to the non-specific aphthous sores in the mouth and throat indicative of mucous irritation in the bowels, and the sores are generally about the size, or somewhat less, than a silver penny, and are commonly accompanied with fulness of both tonsils and uvula.

I feel also pretty well assured that some eruptive affections of the skin are consequent on gonorrhœa, which are distinguished by their pinky stain from the copper stain of syphilis. But I am doubtful whether I have seen more than acne, lichen, and lepra — J F S]

160 The diagnosis of these several kinds of gonorrhœa is in many cases obscure and not to be determined with certainty by characteristic symptoms, but its mild course, the short continuance of the discharge, the condition of the patient previous to the disease, the perhaps ascertained state of health of the person from whom the contagion has been received, in most cases furnish the guide. All gonorrhœa which has a malignant course, in which swelling of the testicles, inflammation of the inguinal and of the prostate glands occur, may be considered as syphilitic. In syphilitic gonorrhœa of women the danger of general syphilis is always greater than in men, on account of the copious secretion of mucus, and the excoriations thereby produced.

[Almost all that can be said on the diagnosis of vaginal discharges has been already mentioned, in speaking of gonorrhœa in women, and leucorrhœa at par 158. The contagious gonorrhœa, or true gonorrhœa of both women and men, has also been shown to be a disease distinct from syphilis, and, therefore, the swelling of the testicles, the inflammation of the inguinal and prostate glands are not to be considered, as CHELIUS holds them to be, syphilitic, but merely sympathetic, and not requiring the treatment necessary for the cure of syphilitic affections. HUNTER observes, in reference to this circumstance — "It sometimes happens, although but seldom, that the glands of the groin are affected in a common gonorrhœa with the appearance of beginning buboes, but which I suspect to be similar to the swelling of the testicle, that is merely sympathetic. The pain they give is very trifling, when compared with that of true venereal swellings, arising from the absorption of matter and they seldom suppurate" (p 61.) COOPER agrees with HUNTER that "buboes of this kind rarely suppurate, but only in very irritable constitutions. He distinguishes sympathetic from syphilitic bubo by "one gland only, in general, being enlarged in syphilis, but in a sympathetic bubo most frequently a chain of glands is affected. Of the two sets of glands in the groin, one just above POUART's ligament, and the other about two inches, or two and a half inches, below it, the lower tier is seldom enlarged from sympathy, the upper frequently" (p 269.)

That discharges from both the male and female genitals have produced, in some instances, gonorrhœa, and in other chancres, every one who has had the slightest opportunity must have observed, and hence has arisen the opinion, long held by many surgeons, that the diseases were one and the same. But the examination of the vagina with the speculum, so largely practised, and on such good grounds

strongly advocated by RICORD, explains the cause of these two sets of symptoms, by showing that in the vagina, and often even on the *cervix uteri*, chancres may exist, whence may be produced a discharge, which, without such examination, carelessly pronounced to be gonorrhœa, will cause chancre, or, if accompanied with gonorrhœa, may produce in one person chancre, in another gonorrhœa, and in a third both diseases at the same time, whilst the infecting party is presumed merely to have gonorrhœa. The use of the speculum, therefore, if only as a mean diagnosis, cannot be too strongly advised. In males it cannot be employed to examine the urethra, in such cases, therefore, it is well, if the practitioner have any cause for suspicion, to inoculate the matter from the urethra into the patient himself. If the discharge be simply gonorrhœal, no inconvenience will ensue, but, if a chancrous sore should follow the inoculation, it is a proof that the disease is syphilitic, and that it must be treated accordingly.

For the examination of the public prostitutes RICORD lays down some rules which, under circumstances where suspicious discharges from the female genitals exist, should always be followed. "The examination ought here," says he, "to be neither slight nor illusive, not only should the external part of the organs be examined, but also the internal and more concealed, for the source of the poison which it is wished to avoid, often lies in the depth of the vagina, on the *cervix uteri*, or even in its cavity, and in these cases neither an external examination, nor the *touche* would suffice, and the speculum alone can warn them of their danger" (p 255, Fr edit p 540).

This able surgeon has also shown the importance of inoculating discharges from the sexual organs, in regard to medico-legal questions as to venereal diseases. "In questions of rape, for instance, the consequences of syphilitic infection are often brought forward as a proof. Well! what practitioner would not, in the present state of science, seeing a man, affected with gonorrhœa, accused of having violated a woman actually infected with chancre, have regarded this pretended coincidence as a proof of great value? But when it is uncontestedly known that chancre alone can produce chancre, if the gonorrhœal muco-pus of the individual supposed to be guilty, produces nothing upon inoculation, after having been properly tried, will it not be evident, in a case of recent infection, that he cannot be convicted? And, again, would it not be proved by the same mode of experimenting, that individuals accused of having communicated the pox, which must aggravate the position of all persons thus accused, have only caused by mechanical violence, or by the action of some morbid or normal secretion, simple inflammations" (p 94, Fr edit, p 197).

161 The cure of gonorrhœa is directed by its severity.

In slight cases the patient should drink whey, almond emulsion, linseed tea and such like, a mild diet, used abstinence from all irritating or heating things, rest, support of the testicles with suspensory bandages, frequent bathing of the penis in luke-warm water, which subsequently, also, for the sake of cleanliness, is to be continued.

If the inflammation and pain be more severe, the following additional treatment according to circumstances must be resorted to bleeding, leeches at the root of the penis or its neighbourhood, and softening bread poultices.

Purgatives, recommended by many in gonorrhœa, are generally more hurtful than useful, and, if necessary on account of impurities in the bowels, should be of the mildest kind, as manna, tamarinds, and not salts, which irritate the urinary passages.

[“The venereal inflammation (or rather the gonorrhœal inflammation—J. R. S.) is not kept up,” says HUNTER, “by the pus which is formed, but, like many other specific diseases, by the specific quality of the inflammation itself. This inflammation, however, it would appear, can only last a limited time, the symptoms peculiar to it vanishing of themselves, by the parts becoming less and less susceptible of irritation. This circumstance is not peculiar to this particular form of the venereal disease, it is perhaps common to almost every disease that can affect the human

body *** As the living principle in many diseases is not capable of continuing the same action, it also loses this power in the present, when the disease is in the form of a gonorrhœa, and the effect is at last stopped, the irritation ceasing gradually This cessation will vary according to circumstances, for if the irritated parts are in a state very susceptible of such irritation, in all probability their action will be more violent and continue longer but, in all cases, the difference must arise from the difference in the constitution, and not from any difference in the poison itself The circumstance of the disease ceasing spontaneously, only happens when it attacks a secreting surface and when a secretion of pus is produced *** Gonorrhœa cures itself, whilst the other forms of the disease require the assistance of art (pp 36, 7) Gonorrhœa may be cured while there is a chancre, and *vice versa* (p 38) (It is very remarkable that with these facts staring him in the face, HUNTER should have persisted in his opinion that gonorrhœa and chancre were one and the same disease — J. F. S.) "How far the gonorrhœa in women is capable of wearing itself out, as in men, I cannot absolutely determine, but am much inclined to believe that it would for I have known many women who have got rid of a violent gonorrhœa without using any means to cure it, and indeed the great variety of means of cure made use of in such cases, all of which cannot possibly do good, though the patients get well, seems to confirm this opinion" (p 59)

HUNTER has made an observation in regard to gonorrhœa, which every one who has had the least experience must accord with, viz., that it is "the most uncertain in the cure of any of the forms of this disease, many cases terminating in a week, while others continue for months, though under the same treatment The only thing necessary to be done for the cure is to destroy the disposition and specific mode of action in the solids of the parts, and as that is changed the poisonous quality of the matter produced will also be destroyed" (p 75) This latter observation does not very well tally with what he says almost immediately after — We have no specific medicine for gonorrhœa," although he comforts himself with "it is therefore very reasonable to suppose that every such inflammation gets well of itself, yet although this appears to be nearly the truth, it is worthy of consideration whether medicine can be of any service in this form of the disease I am inclined to believe it is very seldom of any kind of use, perhaps not once in ten cases" (p 75) "I believe," HUNTER subsequently observes, "the soothing plan is best at the beginning *** In cases where the symptoms run high, nothing should be done that may tend to stop the discharge, either by internal or external means, for by this nothing would be gained, as merely stopping the discharge does not put an end to the inflammation The constitution is to be altered, if possible, by remedies adapted to each disposition, with a view to alter the actions of the parts arising from such disposition, and reduce the disease to its simple form If the constitution cannot be altered, nothing is to be done but to allow the parts to tire themselves out by a continuance of the same action" (p 77)

The employment of stimulating injections of various kinds, for the purpose of checking the discharge in gonorrhœa, has been a favourite practice with many surgeons, and even so long back as JOHN OF ARDEN they were used, but of a very mild character, as shown by his following prescription —

"*Pro Morbo qui dicitur Chaudre-pisse* — Accipe parsillam et coqu in aqua donec in mucilaginem vertatur, quæ mucilago cum oleo rosæ et violæ fortiter agitetur addito lacte mulieris puellam nutritis ana, in quo liquore dissolvatur camphoræ uncia una et pro syringam (injectionem) initiatur Mucilago est quæ quædam viscositas admodum galature piscium vel earum anglice gelee" — MSS Sloane, 2002

Translated by E. H., as follows —

"Seethe the parsley in water till it come to a mucilage, that is, till the water be made green and slimy, and the substance of the herb be consumed Then temper with that mucilage oil of roses and oil of violets and the milk of a woman nourishing a maiden child, and then dissolve therein one ounce of camphor, and by a syringe administer it" — MSS Sloane, 2271

BECKETT mentions another prescription, which, however, I have not found —

"*Contra Incendium* — Item contra incendium virgæ virilis interius ex calore et excoriacione fiat talis syringa lenitiva Accipe lac mulieris masculum nutritis et parum zucarum, oleum violæ et ptisanæ quibus commixtis per syringam infundatur et si prædictis admiscueris lac amygdalarum melior erit medicina"

ABERNETHY objects to any attempt at checking gonorrhœa "By endeavouring to arrest the disease in its progress," says he, "we are likely to induce irritation in the remote part of the urethra, and other affections, whereas if we merely sooth the malady, and allow it to take its natural course, it declines in due season, without, in general, producing any material injury to the part affected, or to any other in its vicinity" (p 278)

But patients will not be content to wait till a clap shall "decline in due season," although recommended so to do on the authority of HUNTER and ABERNETHY. And it therefore becomes necessary to resort to some treatment for shortening the disease, and to relieve the often severe symptoms.

ABERNETHY's soothing practice is especially good when the inflammatory stage is very active, and is not unfrequently sufficient under ordinary circumstances, for HUNTER's supposition, that "every such inflammation gets well of itself," is often true enough. ABERNETHY's plan consists in "bathing the perineum and genitals with tepid water, by means of the bidet and sponge, for five or six minutes every night and morning, at the same time desiring them to wash beneath the fore-skin, so as to remove every thing lodged there, and to wash this part drawn well forward, and to protect the orifice of the urethra from mechanical irritation." * * * I also recommend those who are affected with clap to be very attentive to keeping their bowels in a regular state, because any inquietude in the bowels is likely to produce an irritable state of the urinary organs" (p 278)

I formerly adopted this soothing practice almost entirely, prescribing the following mixture — *B magnes sulph ʒi, potass nitr gr v, acac pulv ʒi, tinc hyoscyam. mv, aq destill ʒi, ter quaterve in die*, under which treatment, either without or with mild injections of sulphate of zinc when all scalding had subsided, the disease was generally cured in ten days or a fortnight. Or I gave pills of the following composition.—*B tereb chiz ʒij, pulv rhe ʒi, syr q s, et in pil ʒij dividend*, four of these twice a-day, were first given, and the number increased afterwards to six or eight as might be needed. But, of late, I have only employed the injection of a very mild solution of nitrate of silver, three grains to sixteen ounces of water, before the scalding ceases, and even when there is inflammation of the testicle, twice or thrice a-day, and I have never yet witnessed any ill effects, but the contrary, as, in two or three days the gonorrhœa is usually stopped.

CARMICHAEL recommends injections into the male urethra twice a-day of a solution of nitrate of silver, ten grains to an ounce of water, for the purpose of cutting short the development of a gonorrhœa. I should be very sorry to follow such practice, as I should fear the almost certain production of stricture. But, if I used the nitrate of silver for this purpose, I should certainly, with RICORD, prefer the following method which he has employed, but does not speak of either in praise or dispraise. "I introduce into the urethra," says he, "LALLEMAND's caustic holder, and then, exposing the caustic, I withdraw it, at the same time giving it a rotatory motion, so as superficially to cauterize the whole of the mucous membrane of the urethra. If, after this first cauterization, too much inflammation supervene, recourse must be had to antiphlogistics, otherwise a similar cauterization should be made three or four days after the first" (p 335, Fr edit., 710)

The following was the plan adopted for many years by ASTLEY COOPER.—In the first week during which there is much inflammation, a draught of *magn sulph ʒij, inf senn ʒjss*, thrice a-day, to produce active purging diluting drinks of capillaire or tea, of which too much cannot be taken, and in which is to be taken daily *potass carb vel soda subcarb ʒij*. He found lime water a very excellent diluent, but did not care about mucilage, and considered the use of soda water very doubtful. If there were much scalding in passing the urine, or the pains from chordee were severe, he gave with advantage of *hq potass wxx, ext comi gr v, ex mist camph* thrice a-day. The penis was kept for a long time in warm water, as a bath, to relieve the inflammation, and after a week overlaid with lint dipped in GOURLARD's wash. Three or four days after which, when the inflammation had greatly subsided, he gave a mixture of *bals copaib ʒi, mucil acac ʒi, mist camph ʒiv*, of which half an ounce was given night and morning. After persisting for two days longer in the use of this mixture, and the discharge being considerably lessened, he employed injections, three or four times a-day, of *hq plumb subacet dilut ʒv, c zinci sulph gr vi*. By this plan a gonorrhœa is safely and expeditiously cured. If the clap be a second or third, the balsam of copaiba may be given at once, and

speedily stops the discharge. The strength of injections should be gradually increased, so as to produce slight irritation, but it is better to vary the kind of injection, *cupr sulph gr ss, aq distill ʒj*, or *hydrargyr oxymur gr j, aq distill ʒij*. The use of bougies, though at first increasing the discharge, is often successful if accompanied with injections (p 193.)

In reference to the cure of gonorrhœa, ASTLEY COOPER observes —“It is difficult in proportion as the constitution of the patient is disposed to strumous affections. If a patient have pimples in his face, enlargement of the glands of the neck, a thin delicate skin, and irritable fibre, you may expect to have great difficulty in curing him of gonorrhœa” (p 191.)]

162 In very painful chordee (1) bleeding, leeches and soothing poultices must be employed. If the pain be not thereby diminished, if the patient be not plethoric, and the pain rather spasmodic, opium, hyoscyamus, camphor poultices of narcotic vegetables and soothing clysters may be used with due carefulness. If, during the chordee, bleeding occur (2,) the symptoms are usually much diminished, but, if it continue and become exhausting, attempts to allay it must be made by compression of the penis, by injection of a solution of gum arabic, and in very extreme cases by astringent injections.

[(1) Painful erections are generally controllable by the administration of a full dose of opium before retiring to rest, and by light bed-clothing. The same is also very useful in chordee, and a bottle of cold water placed between the legs, against the perineum is a very efficient local application. Smearing the chordee part with extract of belladonna is often useful, and in obstinate chordee, I have used mercurial friction with advantage, even before it has become chronic. ASTLEY COOPER recommends enveloping the penis at night in lint dipped in GOURLARD water, or the use of evaporating lotions. RICORD thinks camphor with opium either as a pill or an enema the most powerful internal remedy, and my own observation confirms his opinion. HUNTER says, that ‘in relieving chordee, or the remains of it, which appear to arise from spasm, he has known the bark of great service’ (p 96.)

(2) When bleeding from the urethra occurs, it is generally rather beneficial than otherwise, and only requires control when severe. This may be effected by leading up the finger from the perineum against the under surface of the urethra, till the point whence the blood escapes is found. The penis is then to be grasped between the thumb and finger for a quarter of an hour or twenty minutes, which is generally successful. HUNTER says, in such bleedings, he has “seen balsam of copaiba given internally of service” and supposes that “all the turpentine would be useful” (p 95). If, as RICORD states, though I have not observed it, “frequently the hemorrhage return the first time urine is passed, then, however objectionable it is to place a foreign substance in the inflamed urethra, we must introduce a bougie, which by compressing the vessels stays the effusion of blood. Sometimes additional circular external compression is required, but great caution must be used in its application. Generally this bougie may be removed after twenty-four hours, but, when the haemorrhage has been great, and the instrument does not excite much pain, it is advisable to leave it a day or two longer. If the bougie have been removed too soon, and the haemorrhage reappear, it must be reapplied, if it be not merely a sanguinous discharge” (p 339, Fr edit., p 717.)]

163 If the pain subside and the discharge diminish, a suitable treatment, with a slightly improved diet, with the avoidance, how ever, of all heating things, usually suffices for the perfect cure. The frequent use of diluted fluids must be forbidden, lest by their too great relaxing power they might give rise to gleet. This must be especially attended to in otherwise flabby and scrofulous persons. For such cases we recommend the use of *juniper rob, dulcamara, gum guaiacum, decoction of woods*, and the like. If for a long time there remain a sparing discharge of serous fluid, slightly astringent injections of acetate of lead, sulphate of zinc, sublimate and so on, with opium, may be used to prevent the discharge becoming chronic.

164 In those cases in which a syphilitic form of gonorrhœa is suspected, after the inflammation is diminished or removed, mercury must be used for some time, or, together with a strengthening and tranquilizing diet, the use of decoction of woods must be persisted in, for the purpose of preventing the origin of general syphilis

[It having been already shown that gonorrhœa and syphilis are distinct diseases, and do not generate each other, the treatment just mentioned is superfluous — J F S]

165 The treatment of gonorrhœa in women is precisely the same as that in men, but so strict an antiphlogistic management is not requisite, in general mild injections or steaming is sufficient to diminish the inflammation Astringent injections are to be used and made stronger, if the discharge be inclined to become chronic The excoriated parts are to be covered with charpie spread with citrine or red precipitate ointment — The internal use of mercury, or the use of decoctions of wood, with strict attention to diet, is then particularly necessary

[I have never known it necessary, on account of the acuteness of gonorrhœal symptoms in women, to apply leeches, as recommended by RICORD, but, commonly, in all stages, unless there be inflammation and swelling of the external parts, employ injections of nitrate of silver, ten grains to an ounce of water once a-day, taking care that the vagina being well washed out, none of the injection should be left behind This practice is fully confirmed by RICORD's experience. He says —“ Sometimes acute gonorrhœa in women, whether complicated or not, resists the most judicious soothing treatment, and is aggravated by the use of mercurials In some of these cases, in which the red and turgid mucous membranes afford a copious purulent discharge, attended with acute pain, which neither rest, depletion, emollients, nor narcotics can assuage, I have obtained astonishing results from the use of nitrate of silver A superficial cauterization with solid nitrate of silver, or a solution of it, applied by means of lint, has favourably modified the inflamed surfaces, and produced a solution of the disease After the use of the cautery, a plug of dry lint must be employed to prevent the contact of the walls of the vagina ” (p 324, Fr edit p 683)

Than these modes of treatment I do not know any better Injections of acetate of lead, of decoction of tormentilla, of oak or elm bark and alum, are commonly recommended, but I do not consider them very efficient

It must be borne in mind, in regard to stimulating injections, that some constitutions are more excitable than others, and, therefore, if the injections used excite considerable pain in the vagina, they must be either diminished in strength or entirely left off HOME (a) mentions the cases of two young women, who having been infected with gonorrhœa by the men who debauched them, and having used injections of the strength generally used for common women, had “the sides of the vagina united together by the adhesive inflammation ” (p 90) Such cases are very rare, but serve as a caution in the use of these remedies

If the inflammation be very severe, RICORD's plan of introducing a plug of lint, dipped in emollient narcotic liquid, and renewed twice or thrice a-day, so as to act as a poultice, may be useful, if, as he says, it can be effected without pain

RICORD mentions that “some discharges, which resist all the above applications, seem to be maintained by the contact, even of the mucous membranes and the depth of the parts continually placed in the unfavourable conditions of heat and moisture ” For these he has found good success by “filling the vagina, without much distending it, with dry lint, renewed two or three times a-day, according to the quantity of the discharge, which, in the cases that terminated successfully, was white and milky, and proceeded from the vagina alone ” * * * “ Ulcerations and papulous granulations are to be cauterized with nitrate of silver, which is to be preferred, or with nitrate of mercury on lint,” (p 326, Fr edit , p 686)

Of ulcerations of the mucous membrane of the womb, I have no personal experience, but RICORD says that, “we must here, as in the ulcerations of other parts,

(a) Note in HUNTER on the Venereal

modify the surfaces in a more powerful manner, but the greatest precautions are necessary in cauterizing the interior of so delicate an organ, the reaction of which would be so powerful, for, whilst the strongest caustics applied to the cervix generally produce no pain, fluids scarce possessing any caustic properties, being introduced into the cavity of the uterus, may cause the most serious consequences" Of which he instances, from the use of an injection of one part of nitrate of mercury to eight of water, very violent hysterical attacks in some patients, and, in one, "a cerebral congestion which caused a momentary apprehension of apoplexy These symptoms, which all arose a few minutes after the injections, yielded rapidly to antispasmodics, and, in the case with the cerebral congestion, on a quantity of blood being taken from the arm" He then used one part of nitrate of mercury to twelve of water, but these injections were not always unattended with pain, or some nervous reaction of a hysterical character I then substituted," says he, "six grains of nitrate of silver to the ounce of water, and found that, in some instances, a chronic purulent uterine discharge was cured after two or three injections" (p 327, Fr edit , p 689)

When "vegetations originate in the interior of the urethra, constituting what were formerly termed caruncles and carnosities, they maintain discharges which cease when they are destroyed by incision or cauterization" (p 328, Fr edit , p 691)

When the urethra is affected with gonorrhœa, injections are recommended by RICORD to be used as in men, the fluid being prevented from passing into the bladder, by pressing the back of the urethra against the pubes]

166 If the discharge become chronic, it is usually long-continued, and upon the least excess, the smarting and burning in making water return The many remedies advised against gleet must be used with due attention to the cause from whence it has originated It may be caused by *weakness*, by a *morbidly increased insensibility*, and by *organic changes in the mucous membrane of the urethra*

In the *first* case, balsamic stimulating remedies are to be employed, balsam of copaiva in gradually increasing doses, gum kino, astringent injections of acetate of lead, sulphate of zinc and copper, of sublimate, washing the penis with spiritual fluids and so on In the *second* (which in sensitive persons sets in very soon, if the inflammatory stage of the gonorrhœa be improperly treated) all stimulating and exciting remedies will be injurious HALLFR's acid in a decoction of salep must be administered internally , in very high sensibility a dose of opium, or of *aqua laur-a-cerasi* in emulsion, must be given frequently during the day In this case only are injections of decoction of red fox-glove, of poppy-seed emulsion, with laurel water, with opium and so on of service The patient must carefully avoid every excess In the *third* case, when ulceration, stricture, or diseased changes of the prostate are present, the patient complains of pain at a certain point when touched in making water If the discharged fluid be frequently streaked with blood, it indicates an ulcer, in which case, a suitable antisyphilitic treatment, sublimate as injection, and the use of bougies, is necessary

[Chronic gonorrhœa is commonly known by the name of *Gleet*, and is generally a thin transparent discharge unattended with pain, but under any excitement or excess it becomes white, yellow, or greenish, and, if the excitement be great, even tinged with blood , in fact, the gonorrhœal inflammation is re-excited ASTLEY COOPER considers it to "proceed from the lucanæ of the urethra," in other words, from the usual seat of gonorrhœa But it is often a concomitant of stricture, and sometimes the use of a bougie will reproduce inflammatory action, and an increased discharge, capable of bringing on a yellow discharge, with pain in making water in the female, as happened in a case mentioned by ASTLEY COOPER. (p 272) And he observes —"Gleet is said to be that stage of gonorrhœa where the discharge ceases to be infectious I doubt whether there is such a complaint as gleet, according to this definition, for I cannot help believing that a gonorrhœa never ceases to be infectious * * * I doubt whether a gonorrhœa ever loses its power of causing infectious

infection as long as any discharge from the urethra remains" (p 270) He mentions instances, the first, in which infection followed a gonorrhœa of five months and three days, and the second after fourteen months But HUNTER gives a more remarkable instance, in which a girl, who had been for two years in the Magdalen Hospital, infected a person immediately after leaving that house (p 40) And TYRREL (a) says, that he "saw a case once, where the gleet had existed for six or seven years, and had resisted various means, both local and constitutional, that had been tried for its cure" He tried in this case "touching the under part of the urethra, just opposite the frenum, with caustic This application, for the time, stopped the discharge, but, as soon as the slough came away, it returned just as before, in the quantity of four or five drops a-day" (pp 566, 7) Hence it appears that the disease will continue a great length of time

It is said that gleet resulting from gonorrhœa, may be distinguished from gleet accompanying stricture, but I very much doubt it, and I think COOPER's case, above cited, in which the man, whose stricture was irritated by the bougie, clapped his wife, supports my notion TYRREL, however, mentions the distinction between the two as follows—"If the gleet is merely gonorrhœal, there will be a tingling sensation behind the frenum, and, if the patient indulges in excess of any kind, or takes too violent exercise, thus, together with the quantity of the discharge, will be increased If you ask the patient how he voids his urine, he will say, that the stream is free and uninterrupted to near the extremity of the passage, then, that it stops for an instant, and afterwards passes very well, this symptom arises from the accumulation of the discharge near the lacunæ On the contrary, if there is stricture, the patient voids his urine very badly, and this is influenced very considerably by change of weather, or by irregular conduct on the part of the patient, and, if you inquire more minutely, you will find that the stream of urine is small and completely twisted" (p 567)

ASTLEY COOPER speaks of the possibility of confounding gonorrhœa or gleet with abscess in the lacunæ, the latter, however, he observes, "may be always known by its being absent for a week or more, and then flowing profusely, but not so in a gonorrhœa And the matter from an abscess of the lacunæ is not infectious, whilst the discharge, which begins a gonorrhœa and terminates in a gleet, never loses its power of producing infection" (p 271)

In deciding upon the cure of gleet, let it never be forgotten that, so long as only six or eight drops of the discharge are observed during the day, or even if the lips of the urethra be merely moist with it, on rising in the morning, the cure is not effected, and the person ought not to marry, or he will infect his wife — r s]

ASTLEY COOPER's treatment of gleet consisted in the use of the following medicines — *Bspir æther nitr 3ij, bals copaib 3i, muc acac 3i, mist camph 3iv, si mist cuius capiantur coch magn bis terve indies*, or, should that fail, *B pulv lytt gr 4, tereb chæ gr v pro pil bis terve quotid sumend* As to local treatment, he employed bougies, either simply smeared with oil, or with *ung hydr miltus*, or *ung hydr niti bryd* The latter first in proportion of a scruple of the salt to an ounce, and gradually increased in strength, using at the same time injections, "from which there would be no danger of stricture, as the bougie would prevent it" The injection he preferred was *hydrarg bichlorid gr 4, aq 3ij*, and gradually increased up to half a grain to an ounce (p 272)

A generous diet is necessary in cases where the gleet continues, and not unfrequently it is found advantageous for the patient to take wine Balsam of copaiba, either in mixture or in capsules, is often very serviceable in addition to injections, of which I prefer that of nitrate of silver When the gleet continues very obstinate, there is reason to suppose, as stated by HUNTER, that stricture exists, and it is then necessary to use the bougie

RICORD mentions that "inoculation of a new gonorrhœa has been advised, and is still perpetrated by many practitioners, either to cure a chronic discharge, or to combat, by revulsion, symptoms which gonorrhœa may produce, such as epididymitis, ophthalmia, &c Some, in this case, are content with advising a new infecting coition, others make a kind of inoculation with the mæco-pus of gonorrhœa, carried on a probe into the urethra, or applied to the mucous membrane it is wished to infect, by means of a bit of lint which is impregnated with it * * * However, were I not convinced that the cases in which it is useful to recall an old discharge,

(a) Clinical Lecture on Gleet, in Laneet, 1824, vol ii

or develop a new one, are as rare as some persons think them frequent, and that they have either aggravated the disease they wish to combat, or given it a new complication, I would not apply the muco-pus of a gonorrhœa of one individual to another before having ascertained, upon the one from whom it is taken, that it produces nothing when inoculated with the lancet, otherwise, without this precaution, a patient with gonorrhœal symptoms might be affected with masked chancres, (*chancrea larves*) and communicate to an individual, who till then had only a simple catarrhal affection, without further consequences, all the formidable chances of syphilis" (p 89, Fr edit, pp 188, 9)

I have noticed these proposals for the cure of obstinate gleet, or other consequence of gonorrhœa, merely to point out their absurdity, as I presume no one, excepting those whose treatment of disease is founded on the *similia similibus, eadem usdem* principle, could seriously think of adopting them. The moral conduct involved in the attempt to acquire a new gonorrhœa to put an end to an old one, is about on a par with that of commerce with an uninfected person for the same purpose, (a vulgar notion which was formerly held,) and the benefit from either alike — [J F S]

167 The mode of treating gonorrhœa already mentioned is founded upon the various degrees and nature of this complaint. Of late cubebs have been recommended by many practitioners as the most effectual remedy against it, and, according to my own experience, I must accede to the good report of it given by others, and especially by DELPECH — This remedy operates upon the gonorrhœa not merely, as many suppose, when the inflammatory period has passed over, but it performs its good offices in every stage of the disease. The principal point in the use of cubebs is, that they should be genuine, and given in sufficiently strong doses. With small doses of cubebs the gonorrhœa is commonly increased. At the onset, at least half an ounce a-day should be given, which should be much increased if no special symptoms ensue. In many cases DELPFCH gave four doses daily of two or three drachms each without producing any peculiar symptoms, it is, however, better to divide the doses and give them more frequently. If required to act briskly and for some time, it is most advisable to give a dose every three or four hours, and meal times should be regulated accordingly, or a dose taken even during the night. The usual consequence of this remedy is a gentle warmth in the belly, not always accompanied by an increase of thirst, which generally ceases in a few days, even when the dose of cubebs is increased. If therefore this symptom pass by, it is not necessary to discontinue the remedy, but, if it continue, and pain in the belly be produced, the doses must be diminished to two or three, it may then do good, but its operation on the disease is more tedious. In many cases the remedy produces frequent, thin stools with or without pain in the belly, very rarely accompanied with tenesmus, but never with discharge of bloody mucus. In such cases the remedy must be withheld, solid food forbidden for some days, mucilaginous drinks taken, and then the medicine resumed in the same doses as before, or in smaller ones. Frequently this symptom is the consequence of gastric irritation, which may be relieved by an emetic, and then the earlier or stronger doses may be used. Some persons bear this remedy only when given at meal-time or when food is taken with it. In many cases where it cannot be endured, balsam of copaiva, according to DELPECH's experience, is useful, but, when that causes purging, cubebs must be employed. Frequently do the cubebs produce no satisfactory alteration, but in no instance is the

disease thereby rendered worse. In recent gonorrhœa the burning, the heat, the not very severe pain, and the discharge soon diminish, the latter become serous, and in two or three days the whole has passed off — The same occurs with the slighter claps, even when they are of longer standing. Three doses daily of two drachms each are sufficient in these cases. More severe gonorrhœa in the second or third week, with severe pain, chordee, and so on, yield less easily and only to larger doses. Improvement also takes place very rapidly, the chordee frequently continues longest, but often subsides after a blister, when every thing else fails. Also in those cases in which the inflammation has extended to the neck of the bladder accompanied with discharge mixed with blood, with severe inflammation, with swelling of the prostate glands, if the pain was exceedingly severe, and in swelling of the testicle, this remedy was very efficient. Old and painless swellings of the testicle remaining after acute affection, which were connected with symptoms of general infection, and had even withstood antisyphilitic treatment, yielded to the use of the cubebs, even although general syphilitic disease continued. The same occurred in the swellings of the vaginal glands, if depending on gonorrhœa. During the use of cubebs a mild diet and rest must be observed. The remedies must be continued for at least eight days after all symptoms have disappeared.

DELPECH has disproved by numerous observations that cubebs can produce inflammation of the testicles, as by some supposed Previous to using cubebs DELPECH had given balsam of copaiva in large doses in all stages of gonorrhœa with good effect. Both remedies, according to recent observations, contain an analogous substance. Perhaps the inefficiency of cubebs, when properly administered, may prove the peculiar syphilitic nature of the gonorrhœa. In order to prevent the general infection, DELPECH, when the gonorrhœal inflammation is not too great, uses at the same time twelve to fifteen rubbings-in of half a drachm of mercurial ointment night and morning on both sides of the penis.

VELPEAU (*a*) employs cubebs and balsam of copaiva in clysters, two, four, six, or eight drachms rubbed down with yolk of egg or with decoction of marshmallows.

MICHAELIS (*b*) has tried cubebs on many patients who were suffering from gonorrhœa, and only in one single case, in which gleet had existed for a short time, did he observe a cure. Just as inefficient did he find it in the whites and in chronic catarrh of the lungs.

RICHON and DE SALLE have given, as they assert, with great effect, thirty drops of tincture of iodine night and morning in gonorrhœa. In some cases, leeches were first applied to the urethra, and an antiphlogistic diet coupled with it.

[ASTLEY] COOPER was a great advocate for the use of cubebs. He said it "appears to produce a specific inflammation of its own on the urethra, which has the effect of superseding the gonorrhœal inflammation * * *. In the very early stages of gonorrhœa, when the inflammation is just beginning, it often succeeds in removing the disease in a very short space of time". But he observes—"I do not say that it would be advisable to employ this remedy at once for a first gonorrhœa, where the symptoms of inflammation run very high in a young and irritable person, it is better not to begin with the use of it until a week or ten days have elapsed, and the inflammation is considerably reduced". He thinks it "a most useful remedy also for the cure of gleet, as it is called, where gonorrhœa has continued for a length of time". And also that "the greatest advantage may be derived from combining its use with that of copaiba, when the balsam alone is beginning to lose its effect," and he gives it as a mixture, viz., "An ounce of the balsam of copaiba, an ounce of the mucilage of acacia, two drachms of cubebs, in four ounces of camphor mixture" (pp. 146, 7.)

(*a*, Archives Generales de Medicine, Jan 1827)

(*b*) Journal of GRAEFE und WALTHER, vol. v p 70

For my own part, I may state that I have used cubebs very freely in all stages of clap and gleet, but not with the advantage attributed to it. I do not think it superior to other of the usual treatments, and it often produces much annoyance from loading the stomach. If used, I think it is better to employ it in the shape of extract, as pills, in which form, also, copaiba is prepared, and may be used in like manner. But the more common mode now of exhibiting copaiba in private practice is in little capsules of caoutchouc. Some years ago, we were in the habit of using at St. Thomas's Hospital, the following copaiba mixture, which was very efficacious, and had the advantage of rarely disagreeing with the stomach, a matter of much consequence if the medicine be long persisted in — *Bals copaib spir ætheri nitr aæ vñl, tinct hyoscyam, liq potass, aæ vñl, ex aquâ ter die sumend.* If necessary to increase the quantity of the balsam, a proportionate quantity of mucilage is added — [J F S]

On the use of cubebs, or Java pepper, see

CRAWFORD, J., on the Effects of the Piper Cubeba in curing Gonorrhœa, in Edinb Med and Surg Journal, Jan, 1818, p 32

ADAMS, J., A short Account of Cubebs as a Remedy for Gonorrhœa Ib, Jan, 1819, p 61

JEFFREYS, HENRY, Practical Observations on the Use of Cubebs, or Java Pepper, in the Cure of Gonorrhœa London, 1821 8vo

MAKLY, M., in London Medical and Physical Journal 1821, June

BROUGHTON, S D., in Medico-Chirurg Trans, vol xii p 100

DELPECH, Mémoire sur l'Emploi du Piper Cubeba dans le Traitement de la Gonorrhœe, en Revue Medicale, May, 1822, p 1, June, 1822, p 129

HEYFELDER, über die Anwendung des Bals Copaiæ und des Piper Cubeba, in Heidelberg Med Annalen, vol iii part iv

HACKER, über den Copaiæ-Balsam beim Tripper, in Summarium der Med, vol viii part i 1839

168 *External Gonorrhœa (Gonorrhœa Glandis, Balanitis, Posthitis, Lat, Eicheltripper, Germ, Blennorrhagie externe, Fr)* is either a mere consequence of want of cleanliness, in which case the sebaceous matter secreted by the odoriferous glands collects and becomes acrid, hence it particularly occurs with a lengthened narrow prepuce, or is consequent on syphilitic infection. The latter may always be guessed at when it follows suspicious connexion, is connected with excoriation, and is obstinate

[HUNTER believes, that, "when the disease attacks the glans and other external parts, as the prepuce, it is principally in those persons whose glans is commonly covered with the prepuce, and it is principally about the root of that body and at the beginning of the prepuce, the parts where the cuticle is thinnest, and of course where the poison gets most readily to the cutis, but, sometimes, it extends over all the glans and also the whole external surface of the prepuce. It produces there a soreness or tenderness, with a secretion of thin matter commonly without either excoriation or ulceration. I am not certain, however, that it does not sometimes excoriate those parts, for I once saw a case where the whole cuticle came off the glans" (p 44) I have seen this condition not at all unfrequently, it is quite distinct from any syphilitic affection. Excoriation with little or no discharge often happens to young persons, even children, simply from the acridity of the secretion of the odoriferous glands, and I have seen it produce violent inflammation and swelling of the prepuce, and threatening mortification. It frequently recurs and is very troublesome — [J F S]

In *Gonorrhœa of the Glans which is not syphilitic* the observation of great cleanliness, frequent washing of the glans with tepid milk, lead wash, and so on, are sufficient for the cure. In the syphilitic form, mercury must be used both externally and internally

[The simple treatment recommended by CHELIUS is generally quite sufficient, mercury is never needed. "When the glans can be uncovered and the inflammation is not excessive," RICORD says, the method he has "found best succeed, is passing

the pencil of nitrate of silver gently over the diseased surfaces, so as to cauterize them superficially, after which it is sufficient to put a bit of dry lint round the glans and draw the prepuce over again. Lotions of lead wash or cold water are to be applied over," p. 331,—Fr. ed., p. 669.) This is very good practice, but I commonly use only a little black wash.—J. F. S.]

[168^o *Gonorrhœa of the nose* sometimes occurs during gonorrhœa of the urethra, or whilst there is an enlargement of the testicle from the same cause. The Schneiderian membrane is tender over its whole surface, but not painful, is of a deep red colour, but not ulcerated, and there is a free discharge similar to that of clap.

This disease was first noticed by BENJAMIN BELL, and he mentions two cases of it in the first, "the discharge from the urethra lessened before the testes became inflamed, and on this taking place from the nose, it ceased entirely." It was treated with an astringent lotion and the insertion of sponge moistened in it up the nose, and cured in a few days. In the second case, "the discharge took place during the continuance, and had existed many years, and, although it had frequently become less, it never disappeared entirely." Various attempts at its cure were made without success, "and, though no other symptom appeared, he was advised to undergo a course of mercury, but no advantage ensued" (pp. 29, 30)—J. F. S.]

169 In the treatment of *Gonorrhœa*, of which the ground is a gouty or herpetic disease, and so on, that given for the non-syphilitic gonorrhœa is suitable; but in these cases the inflammation is usually long-continued, even when the disease has run into a chronic form. Then especially must be employed purging, warm bathing, preparations of sulphur, antimony, and so on.

V—OF INFLAMMATION OF THE TESTICLE

170 *Inflammation of the Testicle* (*Inflammatio Testiculi, Orchitis, Hernia humoralis*, Lat. *Hodenentzündung*, Germ.) may be produced by different causes.

[“In some instances,” as observed by BENJAMIN BELL, and it might be added, specially during or after gonorrhœa, “both testicles swell. They seldom, however, swell both at once, but the swelling, on leaving one testicle, is very apt to go to the other, and when both have, in this manner, been affected, they sometimes swell alternately for a considerable time together. I have known this happen for the space of a year and upwards, where the patient, during the whole period, was never completely free of the disease” (p. 337).]

First It occurs most frequently in gonorrhœa, either with a very high degree of inflammation, with dragging pains in the belly and pelvis if the patient move about much, and the testicles be supported, in which case, the inflammation extending to the testicles, first attacks the epididymis, and next the whole gland, or it confines itself merely to the former (*Epididymitis*), or it may be produced when the inflammatory symptoms have declined, by any irritation of the testicle, violent exercise, for instance.

[HUNTER remarks very justly, of the singularity of swelling of the testicle not coming on “when the inflammation of the urethra is at its height, he thinks it happens when the irritation is going off, and sometimes even after it has entirely ceased, and when the patient conceives himself to be quite well” (p. 60).]

Second It may be a symptom of general syphilis.

[Even HUNTER says—“I believe the swelling of the testicle, like the affection